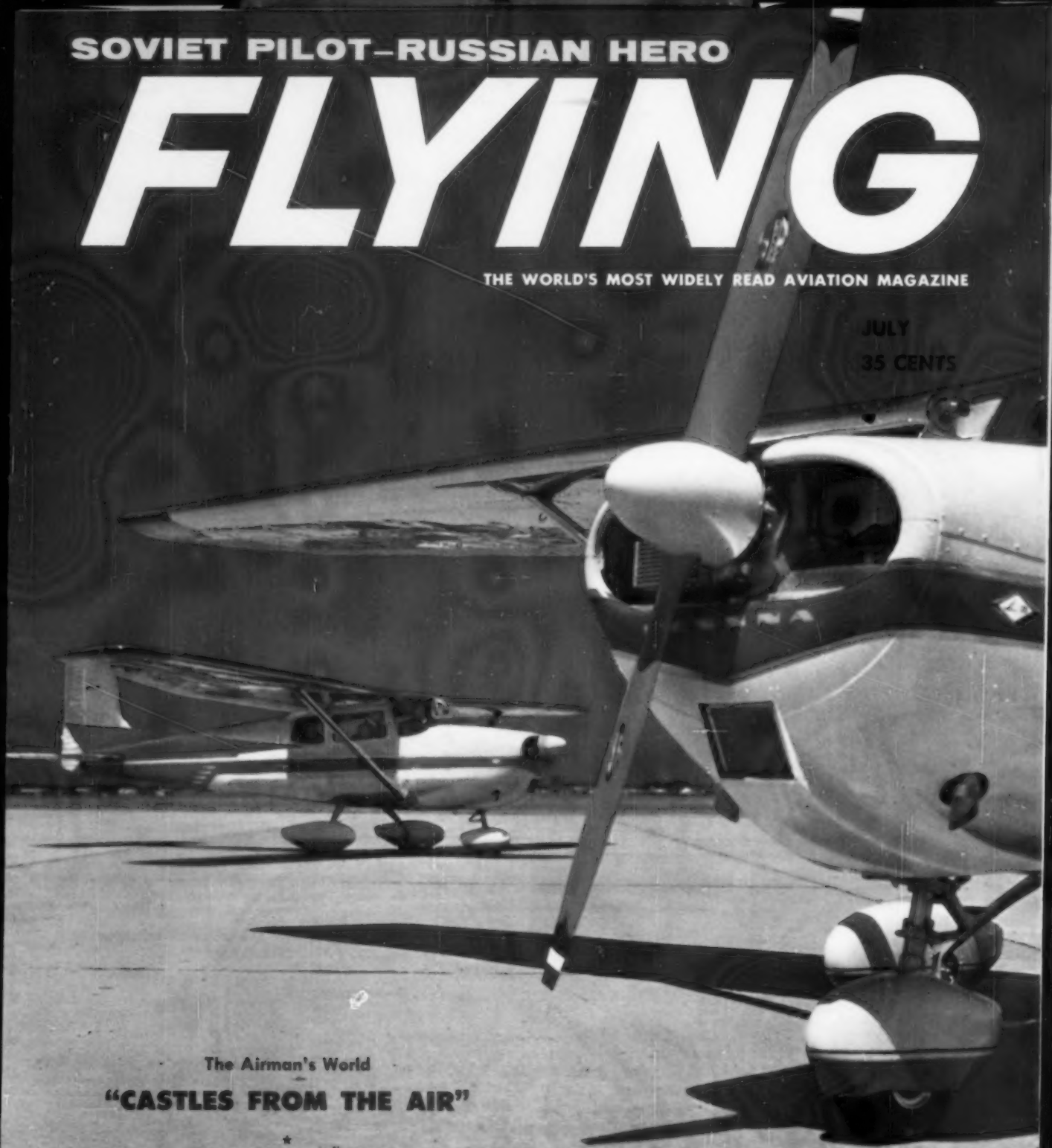
SOVIET PILOT–RUSSIAN HERO

FLYING

THE WORLD'S MOST WIDELY READ AVIATION MAGAZINE

JULY
35 CENTS



The Airman's World

"CASTLES FROM THE AIR"

*

Two Check Pilot Reports:

THE CESSNA 175

THE ZENITH 760 NAVIGATOR

CESSNA 175

ZIFF-DAVIS PUBLICATION

MEET THE WBAALT*!

NEW CESSNA 310B

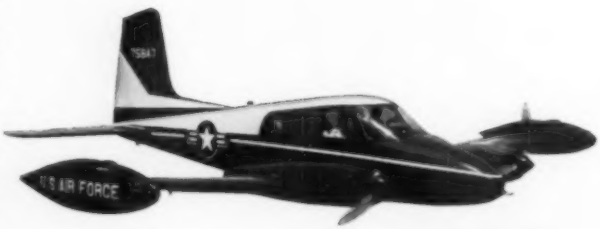
NEW, FASTER CRUISING SPEED

. . . and faster single-engine climb than any other business twin

Look at the new, higher performance you get from the world's best all-around light twin! Cruising speed: 213 m.p.h., 70% horsepower at 8,000 feet . . . high-speed power to climb 415 feet per minute on *one* engine while fully loaded with 5 passengers. It's the great new Cessna 310B!

More advanced design is a major reason for the 310B's top performance. Its tip-tanks channel air flow, increase control as well as speed. Its flat engine nacelles are a mere 21 inches high, reduce air resistance, actually add lift. Retractable landing gear and split-type flaps, broad-span tail group, and 69% of weight below and forward of passengers increase speed, stability, safety. Also highly important: the 310B's two performance-proven, 240-h.p. Continental engines. More advanced design shows up again in Cessna's new, quieter, larger interior—the revolutionary "Comfort-Sealed" cabin. Price of the new Cessna 310B: $59,950 f.a.f. Wichita. Call your Cessna dealer (Yellow Pages of phone book) or write CESSNA AIRCRAFT COMPANY, Dept. F-26, Wichita, Kan. Inquire about Cessna Lease Plans.

**World's Best All-Around Light Twin—Winner of U.S.A.F. Light-Twin Competition*

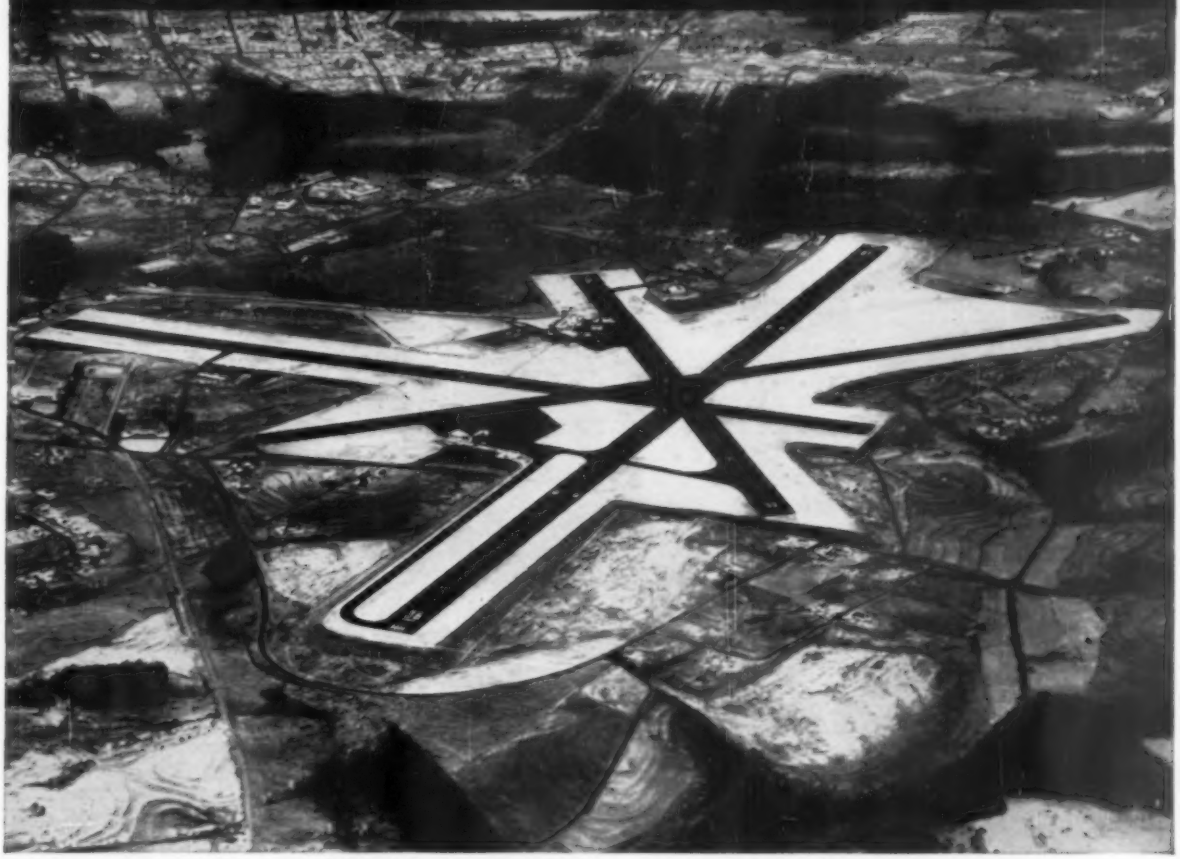


Cessna

6 GREAT CESSNAS 172 175 180 182 SKYLANE 310 THE COMPLETE AIR FLEET FOR EVERY BUSINESS NEED

Test your cross-country memory

Can you name this airport?



Clue: *The Southern textile center it serves lies just east of the Blue Ridge Mountains. (Answer below.)*

Now test your aviation-oil memory: Can you give two important reasons why Gulf oils are better for your engine?

1. In addition to providing efficient, thorough lubrication, Gulf aviation oils help keep engines *clean*—and safe!

2. Gulf-clean engines can go longer between overhauls, because there's less wear and tear on engine parts.

Choose either new Gulfpride Aviation Oil Series D, the detergent oil, or Gulf Aircraft Engine Oil, the straight mineral oil—both keep your engine Gulf-clean and safe.

The airport is the Greenville, South Carolina Municipal Airport, a little over three miles east of the city. All runways are paved. The longest is 5,395 ft.

When you land here, we know you'll be pleased with the friendly Gulf service and the fine Gulf products available.

GULF

AVIATION PRODUCTS

Fly safely with a Gulf-clean engine

FLYING®

JULY, 1958 VOLUME 63, NUMBER 1

CONTENTS

Editorial: Open Windows 22

The Soviet Pilot Is Quite a Fellow . . . . . *R. E. Stockwell* 24

Pioneer of Pioneers . . . . . *Harry Harper* 26

The Idaho-Mexico Annual Tour . . . . . *Peter Guest* 28

Preplanning for the Jet Transport . . . . . *W. Howard Hill* 30

The Airman's World . . . . . *Gill Robb Wilson* 32

Check Pilot Report: The Cessna 175 . . . . . *Norman Jacobshagen* 36

Threshold of Space—*Part II* . . . . . *T. S. Donaldson* 38

Airport Co-operative . . . . . *Matthew J. Bruccoli* 41

Check Pilot Report: The Zenith Navigator 760 . . . *Wayne Thomis* 42

Special FAI Report . . . . . *Don Dwiggins* 44

The Man's the Thing 46

Pro's Nest: When the Chips Are Down . . . . . *Marius Lodeesen* 48

I Learned About Flying From That!, No. 221 . . . *Virgil E. Lamarre* 50

FLYING FEATURES

Mailbox 7

Briefings 10

Hangar Flying 14

Have You Read? 18

Fly-in Fishing Lodge, No. 1 56

Photo Credits 85

Flying Calendar 86

THE COVER: These new Cessna 175's were photographed at Wichita (Kan.) Municipal Airport by Cessna Aircraft Co. See check pilot report, page 36.

GILL ROBB WILSON
Editor and Publisher

C. L. HAMILTON
Managing Editor

ALEX DAWYDOFF
Associate Editor

MARJORIE M. GRAY
Associate Editor

NOVETAH DAVENPORT
Associate Editor

A. M. COURTNEY
Editorial Assistant

—

FIL GIULIANO
Art Director

—

ROBERT B. PARKE
Advertising Director

DANIEL C. MINNICK
Eastern Advertising Manager

JOHN L. FILSON
Midwestern Advertising Manager

JOHN EDWARDS
Western Advertising Manager

Member of the Audit Bureau of Circulations

Ziff-Davis Publishing Company Editorial and Executive Offices
One Park Avenue, New York 16
Branch Offices: 434 South Wabash Ave., Chicago 5, Ill.
Room 412, 215 West 7th Street, Los Angeles 14, California

ZIFF-DAVIS PUBLISHING CO., One Park Avenue, New York 16, N. Y. William B. Ziff, Chairman of the Board (1946-1953); William Ziff, President; H. J. Morganroth, Vice President; W. Bradford Briggs, Vice President; Michael Michaelson, Vice President and Circulation Director; Victor S. Stabile, Treasurer; Albert Gruen, Art Director.

CONTRIBUTIONS: Contributions should be mailed to the New York Editorial Office at One Park Avenue, New York 16, N. Y., and must be accompanied by return postage. Contributors are advised to retain a copy of their manuscripts and illustrations. Contributions will be handled with reasonable care; but the magazine assumes no responsibility for their safety. Any copy accepted is subject to whatever adaptations and revisions are necessary to meet the requirements of this publication. Payment covers all author's, contributor's and contestant's rights, title and interest in and to the material accepted and will be made at our current rates upon acceptance. All photos and drawings will be considered as part of the material purchased.

SUBSCRIPTION SERVICE: All subscription correspondence should be addressed to Circulation Dept., 434 South Wabash Ave., Chicago 5, Ill. Please allow at least 4 weeks for change of address. Include your old address as well as new—enclosing if possible an address label from a recent issue of this magazine.

SUBSCRIPTION RATES: One year U. S. and possessions and Canada $4.00; Pan American Countries $4.50; all other foreign countries $5.00.

FLYING is published monthly by the Ziff-Davis Publishing Company, William B. Ziff, Chairman of the Board (1946-1953), at 434 South Wabash Ave., Chicago 5, Ill. Entered as second-class matter Sept. 8, 1942, at the Post Office, Chicago, Ill., under the act of March 3, 1879. Authorized by Post Office Department, Ottawa, Canada, as second-class matter.

Copyright © 1958 by Ziff-Davis Publishing Company. All rights reserved.

PIPER

WORLD LEADER with the WORLD'S BEST

APACHE—World's largest-selling executive twin. 300 or 320 horsepower with superb Lycoming engines. Over 170 mph.

COMANCHE — Newest, most exciting business airplane, up to 180 mph cruise! 180 or 250 horsepower.

TRI-PACER — World's most popular low-cost 4-place plane. Simplest to fly. Over 130 mph.

SUPER CUB — Famed the world over for general utility flying, training, dusting, spraying.

Whatever your requirement, your choice of a Piper is backed by pilot preference the world over for Piper stamina and ruggedness, famed Piper flight safety, flying ease, dependability and lowest initial investment. For full details write Dept. 7-G.

PIPER AIRCRAFT CORPORATION
Lock Haven, Pennsylvania

Capital-conserving lease and finance plans available.

MORE PEOPLE HAVE BOUGHT PIPERS THAN ANY OTHER PLANE IN THE WORLD

Lightest weight!

THE NEW LEAR ADF-12*

CANNOT BE OUT-PERFORMED BY ANY ADF AT ANY PRICE!

* LIGHTEST IN WEIGHT—17.3 LBS.

PLUS—*provides power and modulation to drive your extra VHF transmitter*

Lightest weight!
Easiest to operate!
Lowest priced!

AND NOW—the Lear ADF-12E-2 with new etched amplifier circuitry and hermetically sealed transformers—has even *greater* reliability and performance.

Most compact, lightweight, inexpensive COMBINATION ADF SYSTEM:

1—Tuning range 190 to 1750 kc in 3 bands with continuous tuning—no frequency gaps.

2—Only ADF with loudspeaker output. 3 watts of audio.

3—Terrific ADF performance—plus communication and range navigation.

4—LEAR EXCLUSIVE—provides modulator power supply for VHF transmitter.

Double your safety with a DUAL Lear ADF-12E-2 at less cost than average single installations.

MODEL ADF-12E-2 TUNER

ADF-12E-2 TUNER: Easy to install. No flexible tuning shafts—direct drive. Easy to read the dial from any position. Press to test button. Improved sensitivity and selectivity. Highest signal to noise ratio.

AMPLIFIER: BRAND NEW ultra clean etched circuitry. Unmatched ADF reliability with hermetically sealed transformers—smallest size and lightest weight. Provides modulator power supply for VHF transmitter—an EXCLUSIVE Lear feature. C.W. optional on Model E-3. Superior tone quality and high power output. Extra long life power supply. Mounts vertically or horizontally.

FERRO-DYNAMIC® LOOP. Hermetically sealed—A.C. motor drive. Lear originated Ferro-Dynamic core. Small size, light weight—easy to install. Superior quadrantal error correction electrically—no cams. Highest loop gain of any ADF.

AZIMUTH INDICATOR: Electrically driven—no flex shafts. Simplified installation. Smoother response—greater accuracy. Dual azimuth indicator available for dual installations.

OPTIONAL MOUNTING: Shockmounts available for optional amplifier mounting—vertical or horizontal.

POWER OUTPUT: 3 watts max.; 1.2 watts undistorted.
POWER USE: Max. 3.3 amps. at 28 v.; 5.7 amps. at 14 v.
WEIGHT: Tuner, amplifier, loop, indicator—total 17.3 lbs.
TUNER: Length 8⅜"; width 6⅜"; height 2⅞".
AMPLIFIER: Length 12½"; width 7⅝"; height 6⅛".

See your Lear dealer or write to LearCal Division: Dept. Y, 3171 South Bundy Drive, Santa Monica, Calif.

LEAR

LC-48

MAILBOX

FLYING SAFETY

In reference to your Mailbox section of the April issue I feel that Stan Brugman of Tucson, Ariz., should be commended for his timely letter, "Insufficient Dual." Since entering the civil flying field as an instructor last year, I am truly amazed at the lack of general flying discipline displayed by the private aviator.

Having accumulated 3,500 hours over a 16-year stretch, I heartily agree that, if I should reach the stage in life where I feel I cannot learn anything more, I'll turn in my suit. The day has come for some serious thought to the promotion of flying safety, among the private flyers in particular. Possibly, a periodic check-ride and the requiring of two-way radios in all aircraft may be steps in the right direction.

Since beginning instructing for a flying club at the local airport, I'm seriously beginning to shudder at the thought of another day—another day of dodging, being cut out of a landing approach by a two-mile final, etc.

Periodic renewals of automobile drivers licenses are required—does it seem so out of line to put a renewal clause on aviation licenses? The alarming increase in small aircraft accidents would make it seem quite necessary.

FEARLESS FOSDICK

Santa Ana, Calif.

GOOD ADVICE

Good advice for Mr. Cummings (May Mailbox) or anyone else planning on airport management as a career would be to enroll in one of the good Aviation Administration courses offered by colleges and universities around the country. The alternative is the long road of experience. It would be impossible to cover even basic information in a letter but I would recommend for his reading, Airport Management by Dr. John Frederick, published by R. D. Irwin, Inc., 1818 Ridge Road, Homewood, Ill.

As it is not generally known to the city fathers, may I add that there are increasing numbers of business-trained and aviation-specialized young men graduating from accredited schools many of whom would enjoy small airport management if it offered a future.

L. S. CASEY
Aviation Department
Norwich University
Northfield, Vt.

HAVE YOU HEARD THIS ONE?

Re: your editorial note to my letter in May Mailbox, asking about fishing up here. Well now, just let me tell you it's the greatest. Remember the old stern-wheeler steamboats? Well, our boats up here have just such a wheel in the rear and, when we catch a fish, we wind up as much of it as we want then cut it off and let the rest into the lake for seed.

CAL CUMMINGS

Detroit Lakes, Minn.

CHECK PILOT

Just completed the check pilot report by Ted Durosko of the Piper Tri-Pacer 160, March issue. To quote: "As the airplane had been pre-flighted by a mechanic, I switched the fuel selector to right tank and went into the starting procedure."

Don't look now, but doesn't that statement fall into the "Famous Last Words" category? Not to discredit the ability of the mechanic or pilot, but there's a pretty

good Navy Flight Safety poster I'd like to pass along . . .

I still get a few odd-ball looks while pre-flighting an airplane that has been flown "only a few minutes ago and runs fine," but there's the old slogan that "The Life You Save May Be Your Own." It might be wise to remember that this slogan applies to more than mere earthly automobiles. The life you save (in the air) may be your own, your family's, or someone's down below.

IVAN S. FLEISCHMAN (Ensign)
USS Lookout (YAGR-2)
A.P.O. New York.

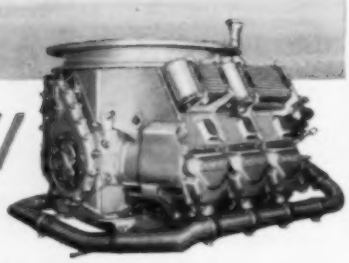
ULTRA-LIGHT

Your story "Is an Ultra-Light the Answer" in April issue covers the history and development of the lightplane very well.

I would, however, like to make a correction regarding the Corben Baby Ace, listing me as the current producer. I purchased the remains of the old Corben Co. in 1953 while chasing down a lead on an old two-place Corben Junior Ace. In 1954 I re-designed and built a modernized version of the single-place Baby Ace which since has become one of the more popular homebuilts. I have received and answered thousands of letters from all parts of the U. S. and the world about

(Continued on page 8)

30,335 Feet UP!



...CESSNA YH-41 HELICOPTER

Sets New World Record, with Continental Power

When Capt. James E. Bowman of the U. S. Army Aviation Board flew the Cessna YH-41 to a new helicopter world altitude record of 30,335 feet, he added another to the long list of major performance records already held by Continental aircraft power. Capt. Bowman's mark, exceeding by some 3,400 feet the previous helicopter record, underscores again the wisdom of engineering the power to its job. The YH-41's Continental FSO526 engine is designed expressly for helicopter use . . . fan-cooled for efficient cooling in submerged installation . . . supercharged for maximum power. Its horizontal configuration permits the engine to be located forward, bringing the load directly below the rotors—an ideal situation in helicopter loading arrangements. Finally, the interchangeability of many parts with those of other models in the Continental aircraft engine line tends to simplify service, and reduce its costs.

Continental Motors Corporation

AIRCRAFT ENGINE DIVISION

MUSKEGON • MICHIGAN

CONTINENTAL IS ON THE MOVE IN 1958

MAILBOX

(Continued from page 7)

the little ship and feel quite proud of its acceptance as a project for the amateur builders.

Because I head the Experimental Aircraft Association, which is a non-profit group dedicated to the advancement of homebuilt aircraft, I decided to dispose of my interest in the assets in 1956 to Mr. Cliff DuCharme of West Bend, Wis., who is further developing the single and two-place versions of the Ace. The company name has been changed to Ace Aircraft, Mfg. Inc. . . .

PAUL H. POBEREZNY
9711 W. Forest Park Dr.,
Hales Corners, Wis.

. . . The ultra-light is not for the pilot who eats a late breakfast in New York and needs to be in San Diego, Calif., by noon of the same day, so let's be practical. . . . Most of the manufacturers today are engaged in building fast, powerful airplanes. They can sell all they can produce so it is going to take some new blood to put the ultra-light in the limelight again. The writer has wanted to fly for 25 years but knows what he can't afford. He believes the ultra-light would solve his problem and that of many others . . . and would like to hear the views of others.

DR. WILLIAM F. ELEY
Sheffield, Ala.

• *We suggest that Dr. Eley get in touch with Paul Poberezny and the Experimental Aircraft Association (address above)*—ED.

A LETTER HOME

. . . We flew from Frankfurt to Brussels by Lufthansa (very nice) Saturday morning, and were at the Fair by noon. It was just magnificent. . . . *I picked up a copy of* FLYING *at the U. S. pavilion.* . . . The U. S. exhibit was by far the best—it's a beautiful building with very interesting exhibits. Went home by train and had a long enough stop-over in Cologne to have dinner and see their famous Gothic Cathedral. . . . A spur-of-the-moment week end, it is the nicest I've spent yet.

ALICE E. COURTNEY
Frankfurt, Germany

THE JET AGE STARTS ON THE GROUND

Your magazine always hits such high standards of interest and accuracy that I can't help raising hob with you about inaccuracies in "The Jet Age Starts On The Ground" in your May issue.

On page 23 there is a picture of Rodgers' "Baby Wright" which is titled "Curtiss," and it's Calbraith P. Rodgers—not Galbraith. Those of us Early Birds who knew him called him "Cal"—in a loud voice, for he was quite deaf.

HARRY D. COPLAND, Gen. Mgr.
Anderson Air Activities
Malden AFB, Mo.

. . . Except that the story refers to "Gal P. Rodgers' Curtiss Pusher" it is a good story with fine reproductions.

(Continued on page 85)

NARCO SCORES ANOTHER IMPORTANT BREAKTHROUGH

ALL-CHANNEL

Sapphire

1016A

VHF RECEIVER-TRANSMITTER

with TRANSISTORIZED POWER SUPPLY

SAPPHIRE 1016A IS CAA TSO'd for scheduled airline use. Unitized construction permits rapid disassembly and unusual accessibility for servicing. Panel-mounted control switches provide crystal controlled frequency selection for SCS, DCS, or random cross-channel operation. Provision included for simultaneous channeling of glide slope receiver when used for ILS. Unit weight 22 pounds; antenna 3.5 pounds.

SAPPHIRE 1021 90-560 CHANNEL VHF RECEIVER. The receiver unit of the 1016A is now offered as a separate all-channel receiver with transistorized power supply in a short-height ½ ATR unit. When coupled with VOR/LOC converter, permits rapid, precise crystal controlled tuning to all NAV as well as COMM frequencies. Designed especially for the remarkable "2½ Sapphire" system, that gives unusual NAV/COMM flexibility and rapid switching of functions to relieve cockpit load.

TRANSISTORIZED POWER SUPPLY reduces weight of 1016A by 4 pounds, length by 3½ inches, is nearly twice as efficient as equivalent dynameter units. With no moving parts, malfunction is virtually eliminated. Thoroughly proved in thousands of hours of flight and accelerated laboratory testing.

MORE POWER, LIGHTER WEIGHT, SMALLER SIZE AND EVEN GREATER RELIABILITY have been engineered into this new Sapphire 1016A VHF communications unit. Thanks to the development by Narco of a revolutionary transistorized power supply, this latest addition to the popular Sapphire series of airline-quality equipment is more than ever the logical choice for airlines and executive aircraft users for an all-channel VHF communications unit.

The Sapphire 1016A provides you with a 90 to 360-channel transmitter with greatly increased power covering every channel with 50 kc spacing between 118 and 135.95 megacycles; and a 90 to 560-channel receiver covering every frequency from 108 to 135.95 megacycles, with the all-important advantage of permitting crystal controlled tuning to VOR/LOC navigation frequencies.

Sapphire 1016 series equipment is in scheduled airline use, has been re-specified for the U. S. Air Force's Cessna L-27's and is in use in hundreds of corporate aircraft.

You'll select the Sapphire 1016A because it provides you with all-channel transmission, all-channel reception both NAV and COMM, because it's years ahead in design and reliability, because it's CAA TSO'd for airline use and because it's sensibly priced. See your Narco dealer or write for new brochure.

narco

National Aeronautical Corporation, Fort Washington, Pennsylvania

MARK OF THE FINEST COMMUNICATIONS

Sapphire 1016A

90/360-CHANNEL TRANSMITTER
90/560-CHANNEL RECEIVER

Briefings . . .

LONGTIME MILITARY PILOT and aviation executive Brig. Gen. Harold R. Harris, USAF (Ret.) has been elected President of the Wings Club in New York to succeed Vice Admiral C. E. Rosendahl, USN (Ret.). In WW I he served in the Army Air Corps; in WW II as Chief of Staff of the Air Transport Command. Became a vice president of Pan Am and president of Northwest Airlines after the war. Is now president of Aviation Financial Services Inc. Elected Vice Presidents of the Club are John H. Cassady, USN (Ret.), Jos. S. Harris and Robert W. Tuttle.

AERO DESIGN & ENGINEERING, manufacturers of the Aero Commander executive aircraft, is to become a subsidiary of the Rockwell Spring and Axle Co., of Coraopolis, Pa. According to George T. Pew, Aero Board Chairman and President, operations will continue at Bethany, Okla., as a separate corporate entity and no change is contemplated in the existing management group.

THE TEXAS AERONAUTICS COMMISSION has set itself a goal of 100 new airstrips in the next year and a half. Mayors and Chambers of Commerce over the State have been contacted urging them to consider an airstrip for their communities and, in turn, offering assistance in selection and establishment of the site. The Commission reports enthusiastic response from all sections of the state.

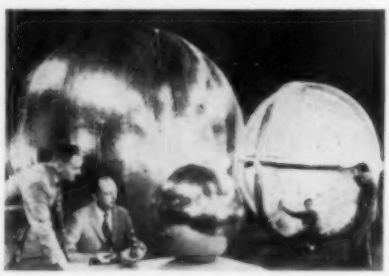
WILLIAM T. PIPER, SR., president of the aircraft company that bears his name and an artist in his own line views an oil painting of himself. The portrait

painter is his daughter-in-law, Marge (right) wife of Thomas F. (Tony) Piper, V.P. and General Manager of the Piper Company.

TWO STUDENT PILOTS who never before had flown more than 250 miles x-country recently flew 2,030 miles from Osceola, Minn. to Miami, Fla., delivering two new Champion Tri-Travelers from factory to the Embry-Riddle Aeronautical Institute. Accompanied by a third Tri-Traveler for the E-R fleet, flown by C. O. (Speedy) Snyder (14,000 flying hours) the students, Donald Prescott, 19, Maynard, Mass., and Wm. F. Weinkel, 21, of Shamokin, Pa., made overnight stops at Memphis and Daytona Beach. Total flight time for trip 20:15 hours.

MANUFACTURING RIGHTS to the Stout Bushmaster, a new version of the old Ford Tri-Motor, held by the Hayden Aircraft Corp., Bellflower, Calif., have been released to Aircraft Hydro-Forming, Inc., Gardena, Calif. Parts for the first Bushmaster are now in fabrication stage at the Hydro plant, with the airplane scheduled for completion later this year. Hayden's engineering and marketing facilities will continue to be utilized under the new arrangement.

SILVER "SPACE-BALLS" pictured here—most visible and least expensive of American satellites—to be launched in the near future are being made by the Reynolds Metals Co., in Richmond, Va. Made of aluminum foil, similar to ordinary household foil, and sandwiched



to a thin sheet of plastic film, the 12-foot inflatable sphere (left), costing $12.56, is believed would be visibile to the naked eye even at a height of 1,600 miles. Wm. J. O'Sullivan of the NACA designed the inflatable spheres to measure the thickness of air above the Earth's Surface.

AT KITTY HAWK, N. C., where the Wright Brothers made their historic flight 55 years ago, a Museum is being built to commemorate man's first flight in powered aircraft.

DEADLINE FOR COMMENTS on the Bureau of Safety's Release No. 58-2A dealing with amendments to Part 20 CAR has by popular demand been extended from April 18 to July 15, 1958. Among other things proposed in 58-2A, five hours of instrument flight instruction would be required for private pilot applicants; 10 hours for commercial; and total time for a private license increased from 40 to 50 hours. Comments should be submitted in duplicate to CAB, U. S. Bureau of Safety, Washington 25, D. C.

DEVELOPMENT AND SUCCESSFUL TESTING of a hydro-ski for Goodyear's Inflatoplane gives this unique aircraft the additional capabilities of landing on water, snow, mud or other slick or hard surfaces. Easily attached to the main landing gear, the hydro-ski is of lightweight

aluminum alloy. Powered by a single, two-cycle, 40-hp engine, the plane, produced for the Office of Naval Research, is made of rubberized Airmat fabric and airship fabric. Less air pressure than is necessary to inflate a passenger car tire is needed to pump up the plane.

SHIPPERS OF AIRFREIGHT will be interested in the new lightweight, aluminum containers—84 in. long, 42 in. high and 52 in. deep—which American Airlines and Grumman aircraft have recently developed. Called the "Paul Bunyan Box," it enables shippers to move goods swiftly by air in complete security. Built with a full-length, hinged door, the container can be locked and sealed and is easily moved around on eight roller bearing coaster wheels. American has placed an order for 60 of the boxes.

MARKING ON THIS new Beech F50 Twin-Bonanza indicates that this is not just another air-to-air shot of this popular executive aircraft. This is a tailored job headed for Jordan and its personal owner, King Hussein. Flown to Jordan by Capt. Bobby G. Mayo, chief pilot of

Ferry Service Inc., and co-pilot Jack Backman, the plane's route was over the North Atlantic to the Azores, to Switzerland, Rome, Athens and thence to Amman. This was the 7,000th plane delivered by Ferry Service, Inc.

CARPETING IN AMERICA'S new jet airliners will not only be soft to the feet and the upholstery and trimmings pleasant to the eye, but will be made of the costliest yarn ever produced. Called Tycora yarn, specially processed by The Textured Yarn Co. of Philadelphia, Pa., the carpeting and upholstery made of it are flame-resistant, resilient, easy to

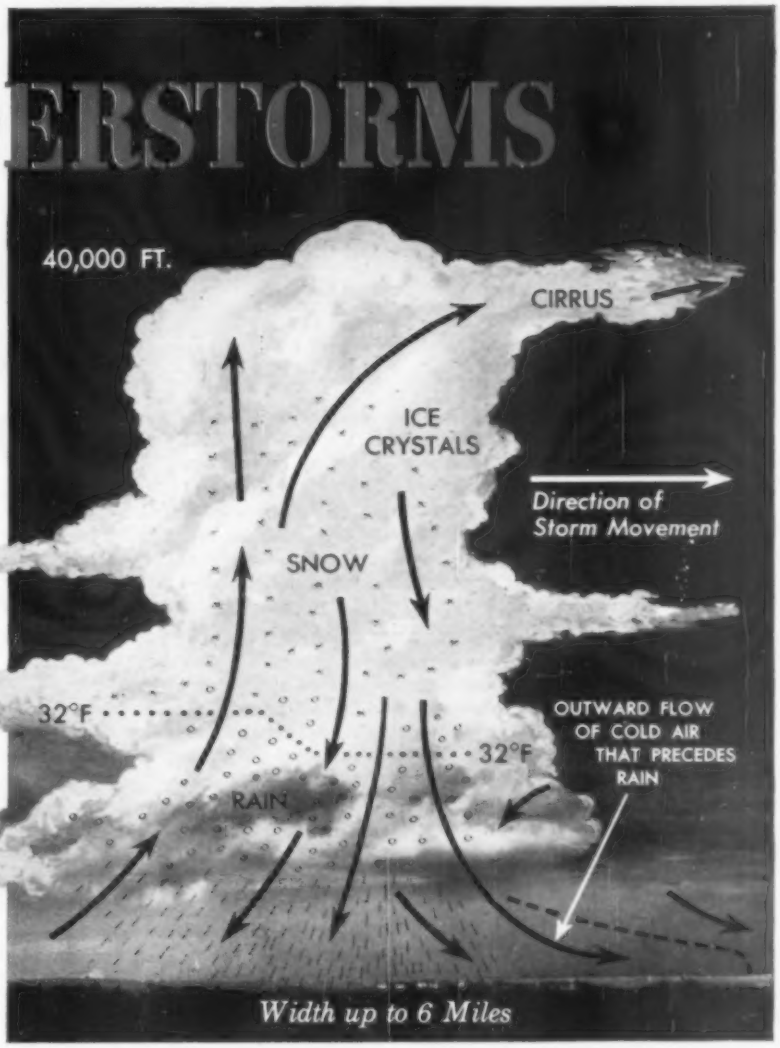
(Continued on page 90)

FLY WEATHER-WISE

Mobil

These weather items prepared in consultation with the United States Weather Bureau

THUNDERSTORMS



SINCE most flyers avoid thunderstorms either visually or with radar, the only time they usually have to be reckoned with is near airport during take-offs or landings. Diagram at right indicates hazardous features of a mature thunderstorm.

Notice the wedge of rain-cooled air that pushes along the ground ahead of the storm. It is this rush of air that creates the greatest hazard to planes maneuvering in the vicinity. Very sudden wind-shifts may destroy lift momentarily and sudden drop in temperature can adversely affect engine performance. Cold downdrafts precede and accompany heavy rain and are usually followed by updrafts in rear portion of storm.

Maximum turbulence occurs in region of heavy rain where downdraft is closest to updraft. It is encountered between 12,000 and 20,000 ft. Maximum hail occurs between 10,000 and 15,000 ft., sometimes in clear air just outside cloud.

If forced to fly through storm, take following precautions: Prepare engine, de-icing equipment and instruments for changing conditions. Avoid turns and other maneuvers after penetration. Avoid over-controlling, ride with the drafts. Slow down to safe speed, but don't lower flaps to accomplish this. Don't try to adjust throttle for every change in airspeed indicator which is affected by brief pressure changes and rain.

FORECAST:

Top Flight Performance with Mobilgas Aircraft and Mobiloil Aero!

For top power . . . unsurpassed protection, rely on Mobilgas Aircraft and Mobiloil Aero. This famous fuel and quality lubricant have been designed to assure immediate throttle response and dependable performance under all weather conditions. Fly safely! Fly with Mobil!

SOCONY MOBIL OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORP., MOBIL OVERSEAS OIL CO., INC.

Tune in "TRACKDOWN" every week, CBS-TV. See your local paper for time and station.

Mobil

Leader in lubrication for 92 years

Arizona's Governor, former U.S. Senator Ernest McFarland, boards Apache commuter express at Sky Harbor for business trip to Nogales, Arizona.

Another in a series on commercial aircraft operations . . . why light aircraft, like all major airlines and business fleets, use Champion Spark Plugs. Noted aviation authority reports on APACHE AIRLINES'

Desert Express

by

HERB FISHER

International aviation authority, veteran test pilot, author

● In a land once left to wind, sun and Apaches, the world's longest municipal airstrip shimmers in 120-plus heat. A TWA Constellation lumbers in. A jet bomber, built there, roars off. An American DC-7 disgorges squinting passengers—participants in modern Arizona's expanding wonderland of industrial, mining, resort and agricultural progress.

At Gate 1, Tucson Municipal Airport, three men with brief cases board a tiny, air-conditioned Bonanza, desert-hued in pastel paints. Three businessmen. A doctor, a lawyer, an Indian Chief.

Clock says 2:15.

The world's smallest intra-state certificated scheduled airline rams its "commuter express" down a fraction of the 15,000-ft. runway . . . past bombers, giant airliners, modern factories . . . over the "young-skyscraper" skyline of mushrooming Tucson . . . into the 50-degree "chill" above the 9,000-ft. Santa Catalina Mountains.

Forty minutes from Tucson takeoff, the *Apache Airlines* business commuter drops from sunny skies to Sky Harbor Airport, Phoenix, swank crossroads of a nation. Minutes later, engine hot, Apache wings back toward Tucson—with a senator, a mayor, a rancher.

To the southeast, meanwhile—in the one-time stronghold of Geronimo, Cochise and Satanta—another Bonanza slips through legendary Apache Pass to Sierra Vista and historic Fort Huachuca, bloody frontier outpost and modern-day Army Electronics Proving Grounds. Time from Tucson: 20 minutes. Passengers: A colonel, a scientist, a technician. Freight: The usual items requiring special handling or immediate delivery—plus a delicate bouquet of roses for a G.I.'s lady friend.

Apache swings by new Tucson tower adjacent new municipal airstrip, world's longest. Tucson Airport Authority celebrates Ten Years of Aviation Advancement ($6 million airport improvements) October 18-19 with dedication of complete new airport facilities and base for 152nd Fighter-Interceptor Squadron of Air National Guard. Tucson Airport Authority forecasts for next decade: "Best airport in the West for jets."

At the Mexican border, a third Apache Airlines commuter rises from Nogales International Airport, campsite of Spanish *conquistadores* four centuries ago. Enjoying spectacular scenery from the relaxful cabin are a mining engineer, Mexican envoy and University of Arizona official . . .

Back in Tucson, a wiry Westerner sweats over torn-down engines in one of Tucson Aviation Company's many hangars. Phone jangles. He talks, slips quickly from coveralls into Western business garb, taxis a fourth desert-hued Apache commuter to Gate 1, makes rapid flight preparations. Six businessmen arrive. Then two Beech Bonanzas dart over the mountains on the same scheduled run.

The A&E mechanic piloting the extra section is "Mr. Bonanza" himself—M. L. "Babe" Clements, quiet, soft-spoken owner and president of both Apache Airlines and Tucson Aviation Co., and a state CAA Maintenance Inspector. He's "Mr. Bonanza" in aviation circles because they say he knows more about flying and maintaining Bonanzas than nearly anyone else. Some 7,000 of his nearly 10,000 hours have been in Bonanzas —and many times that number "under-the-hood" in Bonanza engines and airframes.

Herb Fisher

A top mechanic with TWA until 1941, Flight Line Superintendent for Consolidated Vultee during the war, Babe started Tucson Aviation in 1946. Today it is sales and service center for much of the Southwest's light aircraft, and for northern-based aircraft of the Mexican government—maintenance to major overhaul. TA also provides precision flight instruction — classroom and aloft — for businessmen and University ROTC units. TA flies charter and contract missions—Cessnas and Bonanzas under U.S. Forest Service contract, for example. In the remote, pine-covered Catalinas north of Tucson, Babe and his men dropped 4,200 pounds of supplies to firefighters in a single day last summer.

Apache Airlines began just a few months ago as a natural outgrowth of

Apache Airlines moves proudly over ancient Apache trails skirting snow-crowned Santa Rita Mts., rising along Mexican border from famed Saguaro cactus forest. Champion-fired Bonanza has automatic rudder control for rough-air comfort; plush cabin is air-conditioned. Pilot: Babe Clements.

Tucson Aviation—a natural outlet for a man steeped in maintenance . . . a perfectionist, who won't send a plane up with a harmless oil smudge on a cowling; a dynamo, who doubles as pilot or mechanic far into the night, cleans shops or washes planes on Sundays, returns at midnight to personally put brake lining on a plane—and hasn't had a day of vacation in ten years.

Babe's commuter and international airline feeder service now carries over *1,000 persons a month!*—and he's planning route expansion to other cities in the business-booming Grand Canyon State.

Constant engine-straining takeoffs from airstrip elevations as radically varying as *1,100 feet* at Phoenix and nearly *5,000 feet* at Ft. Huachuca . . . continuous, engine-burdening, high-RPM "climbing-out" at drastically different altitudes—26 times daily, every day . . . engines heating to near-maximum temperatures, cooling rapidly, then again heating quickly . . . all this, compounded by other operational detriments such as Mexican fuels and flight infiltration of fine abrasive sand—*that's why "Mr. Bonanza" sweats long hours balancing and perfecting his engines with the very finest products of American engineering.*

"We've had long experience with many kinds of aircraft and their vital components in this grueling proving ground," Babe says. "And you just *can't beat a Beech Bonanza fired to life by Champion Spark Plugs.*"

Babe has obtained CAA authorization for 1,000-hour engine overhauls instead of the usual 800—despite Arizona's wicked extremes of heat, elevation and elements! Champions have been instrumental in making this possible:

"Though I could get 1,000 hours on Champions in Bonanzas easily—I've done it—I actually replace plugs much sooner," Babe says. "My mechanics tell me I'm crazy, 'cause the plugs are still practically good as new. But the point is—that's *how* I get peak engine performance right up to the 1,000-hour major: minimizing wear by keeping vital components new and clean all the time . . . reducing engine load and vibration by balancing . . . requiring my pilots to refrain from the common practice of RPM overloading despite its economy.

"Since an engine's life and reliability depend *so much* on the spark plug, we *must* use only the most dependable plug. Charles Hoefelmann of General Aviation, the Champion distributor here, gives us quick service on the *very best.*"

Spanking this hustling baby airline to maturity in safety and service perfection with Babe are several "old-timers" in aviation: The four regular and two stand-by pilots have a galaxy of experience and professional ratings—CAA-certified A&E mechanics, for example; they have an average flying time of 8,000 hours, an average age of 39, and all are family men with children. Like Babe, they live, eat, sleep, and breathe aviation . . . and are genuinely proud of the dauntless Apache spirit they've ingrained in the character of their modern young airline flying ancient Apache trails.

R.W.F. "Bob" Schmidt, retiring President, American Assn. of Airport Executives, and Manager, Tucson Airport Authority, greets Tucson Mayor Don Hummel, in from business trip via Apache commuter (l/r). Pilot: Charlie Jenkins.

Night maintenance at Tucson Aviation Co. Upper left, Apache commuter comes in with landing lights on.

"Champions in Bonanzas—the perfect combination." Babe Clements (r) tells Tony Orgain, Champion Representative, and Charles Hoefelmann, Champion Distributor (l/r).

Champion Spark Plug Company
Toledo 1, Ohio

READ WHAT PILOTS SAY ABOUT THE TR-102 2-WAY VHF

(Copies of the following letters furnished on request)

". . . at times I was transmitting as far as 60 or 70 miles away and they were receiving me loud and clear."—Raymond C., Hot Springs, Ark.

". . . I am extremely happy with it."—F. R. C., Tallahassee, Florida.

". . . the TR-102 outperforms sets that cost twice as much and more . . . a real accomplishment in Aviation Radio."—P. C. G., Wisconsin.

". . . able to receive it at 2000 feet about 75 miles out with loud and clear response from the tower."—L. E. W., Independence, Missouri.

". . . TR-102 in SAC AERO Club's Cessna 170 does all you advertise."—J. W. R., Ft. Worth, Texas.

(The Above Are From Just A Few Of The Thousands Of Satisfied Users)

AIR-O-EAR 23-CHANNEL TRANSMITTER-RECEIVER

FOR ONLY $189.00 Complete and Ready to Operate

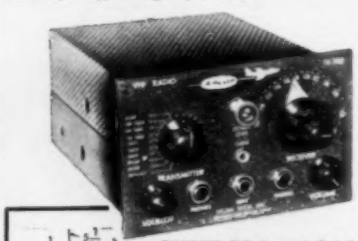
30 to 60 MILE RANGE

NO IGNITION SHIELDING REQUIRED

23 Channel Transmitter, sensitive VHF receiver, tunes 108-128 mc. Powerful Superheterodyne circuit with grounded-grid RF amp. Dual tubes used throughout. Precise vernier tuning with temperature compensated drift control. Front Panel Modulation Monitor and Power Level Indicator.

EASY TO INSTALL IN 1 HOUR OR LESS

Here's What You Get . . . 23 Channel VHF Transmitters and Tunable VHF Receiver, Power Supply — Operates from either 6 or 12 Volts, VHF Whip Antenna and Co-ax Cable, Two Crystals, Factory Installed and Adjusted: Tower (122.5), Emergency (121.5)



MEETS FCC and CAA REQUIREMENTS

Weighs 2½ Lbs., Draws 4 Amps at 12 V. Power Supply: 4" x 4½" x 6", Wt. 5 Lbs.

WRITE FOR FREE LITERATURE OR ORDER FROM THIS CONVENIENT COUPON WITH 10-DAY RETURN PRIVILEGE.

NOVA-TECH INC. (July Flying)

1721 Sepulveda Blvd., Manhattan Beach 31, Calif.

Please Ship Air-O-Ear TR-102 with 10-Day Return Privilege. Specify 6 or 12 Volt. Specify Additional Crystals Required at $10.00 Each:

____ ____ ____ ____

____ ____ ____ ____

☐ Enclosed is $_____ ☐ Send COD

NAME .....

ADDRESS .....

City, State .....

HANGAR FLYING

LESSON IN PATIENCE

I LEARNED A LESSON in patience and flying one night at the little airport of Monahans in West Texas.

The date was November, 1948, and I was instructing G.I. students at an approved school.

On this particular night, we had departed from Monahans at sundown for a round robin to Big Spring, Sweetwater, and return. Our plane was a BC Taylorcraft which was used for both night flying and as an instrument trainer.

The trip proved routine. We arrived back over the Monahans field at about 1 a.m., only to find the airport shrouded with ground fog.

This was rather a surprise as the weather had been excellent for the entire trip. Here we were, circling the field at a thousand feet and no way to get down.

The logical thing to do, of course, was to backtrack to Midland and land with the aid of a clear night and runway lights. However, another angle to the problem would be to cruise around for a time and see if the fog would disperse.

We decided on the latter plan and made up our minds to circle over the field for at least an hour before going back to Midland to spend the night.

Fuel was no problem because the T-Craft was equipped with three gas tanks. Impatience was our "gremlin" this night. Did you ever try to kill time over an airport when it was long past bedtime?

Twenty years of flying experience aided Bob Gilmore when the chips were down.

Finally the end of the runway was visible through the moonlit patches of fog. This was our chance. Taking over the controls, I made our let-down, hoping to get the wheels on the runway before we flew into the mist.

Our visual approach suddenly became an instrument climb-out, no luck this time. Without runway lights or tower communication we were on our own.

A short time later another runway was visible, this one looked better. I reassuringly told my student, "This time we will get her down." So, once more, a power approach, landing light on and a nice touchdown on the very end of the runway. Seconds later the fog enveloped us while the plane was still rolling at perhaps 40 miles an hour. I was trying every trick I knew to keep it straight down the runway.

The next few seconds climaxed the entire flight. It happened in rapid sequence. First, the airplane veered off toward the right shoulder of the runway despite all my efforts to keep it straight, and almost simultaneously our left landing light illuminated a breath-taking scene. Parked in the middle of the runway was the company Buick, and running for cover was the manager's son. Unknown to us, he had been setting out flare pots as runway markers, not realizing that we were attempting another landing.

In a flash, we went past the automobile, the left wing of the plane overlapped the car without touching it, only because we were on the sloping shoulder of the runway.

A few yards more and we had the plane stopped, then a slow taxi back to the hangar.

Two pairs of knees were still knocking when we climbed out of the plane.

ROBERT F. GILMORE
Lubbock, Tex.

MURDER WILL OUT

THE DAY WAS A MURKY one . . . low ceiling and the soft, wet feel that follows a night of hard summer rain. I was patrolling line near the north border of the state of Oklahoma, headed into the Sunflower State, when I noticed some mighty crooked tracks snaking their way along a red-mud country lane so familiar on the Oklahoma scene. The line followed the muddy road, and the crooked tracks skidded along in a haphazard fashion that held my attention about as much as the line I was patrolling.

Suddenly, I stiffened in excitement, for the tracks ended in the form of a stranded automobile of rather late design. Looked as if someone was in trouble. I would take a closer look and see if I could be of assistance in some way. I did notice one pair of foot prints jogging their way in the deep mud, so I guessed the driver had gone on to seek aid for himself and his stranded car. How glad I was that airplanes did not wallow on highways!

But what was that? Lying under the right front wheel, mired down in the blood-red muck was the form of a man . . . the head seemingly bearing the weight of the car. I wheeled around and flew low over the scene and the form did not move. It was half curled up, head forward and feet and body lying half under the fender and body of the

(Continued on page 83)

You've got to fly it to believe it

It's the 1958 *4-Place* Skimmer Amphibian
With a Completely New Kind of Performance

Fly the Skimmer IV from land or water and your interest in amphibians will take off in a wonderful *new* direction. That's the only way to buy *any* airplane: fly it and let *it* convince you—if it can.

We'll bet on the Skimmer any day in the week.

Power and Performance—Set the throttle and you can taxi the Skimmer like a motor boat . . . up wind . . . down wind . . . cross wind. Its true marine hull rides the waves like a boat. And the wind won't tip it on a turn—because the wing floats rest firmly on the *surface* of the water.

Start your take-off run and this agile amphibian, with the dependable 180 Lycoming and the *constant-speed* metal prop by Hartzell, jumps from the water in seconds. It will take off from a small field even faster . . . climb up to 1200 feet a minute . . . cruise at over 130 miles per hour.

The Skimmer's extremely slow landing speed enables you to set it down on any landing strip—and *stop* within less than 400 feet. (As you might expect, a good stretch of water gives you room to spare.)

All in all, that makes the Skimmer a "natural" for getting in and out of tight places . . . like small airports and lakes . . . even ponds and bayous.

Exclusive "Hi-Lift" Flaps—One reason for its low landing speed is the Skimmer's *exclusive* "hi-lift" flaps. They work like a charm.

With flaps down, you can cut all power and this graceful, easy-to-handle amphibian tends to *hover* like a bird. But whether climbing, cruising or coming in for a landing, you'll be amazed at the Skimmer's big-plane stability.

Once its wheels touch the runway, or its hull brushes the water, the Skimmer amphibian is *in*. All you need to do is to guide it "home" and cut the power.

More Room, More Visibility—Another thing you'll like about the Skimmer is the roomy interior—with the wide seats that give you *extra* shoulder room. You'll like the wider visibility, too, because in the Skimmer you sit forward of the wing. That means you can see up . . . down . . . and almost all the way around.

Construction and Maintenance—One thing you can't see in any airplane is certain construction details. But because this *versatile* amphibian is built for water operations, you can be sure that it's as rugged as they come.

It is also made to take salt spray day in and day out. For every piece of metal in the Skimmer is completely alodined and chromated *before* it reaches the assembly line. This assures you that all "hidden corners" and metal overlaps in the finished plane are protected against corrosion.

As for the engine and propeller, they're mounted above and behind the leading edge of the wing. Thus the Skimmer's wing acts as a shield to protect them from flying spray. Net result: there's no additional engine or propeller maintenance over that of ordinary land planes.

Think of the greater freedom of flight a *true* amphibian offers you. Think of the lakes and bayous and hidden uplands you've never visited.

Why wait? For complete information, or the name of your nearest dealer, write today to national sales headquarters. Address Amphibious Aircraft, Inc., Teterboro Airport, Teterboro, N. J.

SKIMMER *IV*
—the agile amphibian

Dealer Franchises Available. Your Inquiry Invited.

Modern defense in action:*

Nike Hercules missile blocks sneak attacks

On guard at the outskirts of all major American cities and industrial centers, missiles of the Douglas Nike family are designed to intercept and destroy attacking aircraft – despite the most vigorous evasive action.

Nike-Ajax was the Army's first supersonic anti-aircraft missile. The basic design readily lends itself to new developments as anti-aircraft requirements change.

Nike-Ajax batteries are now being integrated with a newer Nike – the Hercules, developed through the joint cooperation of Douglas, Western Electric and Bell Telephone Laboratories. It has twice the range and speed of its predecessor. Armed with an atomic warhead, Nike-

*Defensive systems—The deeper our circle of air defenses, the greater our chances of stopping all enemy attacks. This means fast, far-ranging interceptor aircraft backed up by highly accurate anti-aircraft missiles, such as the Douglas Nikes.

Practice firing at White Sands Proving Ground of the Army's new medium-range Nike-Hercules interceptor missile

Hercules can blast entire attacking fleets of aircraft with a single shot—without damage to surrounding terrain.

Designed primarily for the inner line of our overall air defenses, Douglas Nike missiles are radar guided from ground installations. Within seconds of the first alert, they can be off towards their target—with deadly aim.

Depend on
DOUGLAS
first in Missiles

YOUR greatest FUTURE is in ENGINEERING

ELECTRONICS AERONAUTICS

The greatest need in the world's history for trained engineering brains is NOW. YOU can take advantage of this need to achieve success quickly. YOU can make big money—and have an unlimited future—if you decide NOW to GET INTO THE FIELD OF ENGINEERING.

The quickest and best way to do this is by studying at Northrop Institute. IN JUST TWO SHORT YEARS you can be employed by one of the leading electronics-aeronautics companies, at a very high starting salary.

Northrop has trained hundreds of young men just like yourself—normal, intelligent, ambitious—who are now making a name for themselves with such companies as: Autonetics Division of North American, Astronautics Division of Convair, Servomechanisms, Inc., Radioplane, Jet Propulsion Laboratories, and hundreds more.

So, whether your interest lies in the *communications* aspects of Electronics, automatic guidance systems, electronic computers; or *control* and *safety equipment systems;* whether you wish to specialize in *piloted aircraft* or *missiles*—Northrop Institute is the place to get your education.

Approved for Veterans

Northrop
Aeronautical Institute
An Accredited Technical Institute
1119 W. Arbor Vitae Street
Inglewood 1, California

Mail coupon for Free Catalog

NORTHROP AERONAUTICAL INSTITUTE
1119 W. Arbor Vitae Street, Inglewood 1, Calif.

Please send me immediately the Northrop catalog, employment data, and schedule of class starting dates. I am interested in:

- ☐ Aeronautical Engineering Technology
- ☐ Electronic Engineering Technology
- ☐ Aircraft Maintenance Engineering Technology
- ☐ Master Aircraft and Engine Mechanic
- ☐ Jet Engine Overhaul and Maintenance

Name ..... Age ..
Address .....
City ..... Zone ... State .....
Veterans: Check here ☐ for Special Veteran Training Information.

HAVE YOU READ?

By JAMES F. SUNDERMAN

TALES OF A FLIER'S FAITH, by Ed Mack Miller (Doubleday, $3.50).

An airman cannot help but believe in God, claims Miller, a United Air Lines pilot and ANG jet jockey. There isn't a cockpit that will fit an atheist. With this firm belief and strong yield to the Catholic faith, Ed Mack collects 20 of his short stories that home-in on this theme. Some are original. Others have been previously published in Catholic magazines during the past few years. All have an aviation background and reflect a feeling for flight that only a flier himself could portray.

THE DAMNED WEAR WINGS, by David M. Camerer (Doubleday, $3.95).

Writing with a background of personal experience in Italy in WWII, Dave Camerer creates a novel about the men and the lumbering, Foggia-based B-24 Liberators of the 15th AF in the campaign against the heavily-defended Rumanian Ploesti oil field complex. It is a realistic story that plays on the fear, joy, love and hate, courage and cowardice of air crews under the strain and tension of the deadly continuous "run" to Ploesti.

OPERATION GRASSHOPPER, by Dario Politella (Robert Longo, $4.95), with a foreword by General Mark Clark.

Dario Politella draws on his personal experiences as PIO for Army Aviation in Korea to compile a little-known illustrated history of Army lightplane operations during the Korean war. It features L-4s, 5s, 17s, 19s, 20s, 23s and the H-13s, 19s.

The book consists, in the main, of an accumulation of flying stories dealing with the combat experiences of Army flyers on various types of missions.

Army aviation made a proud record for itself during Korea and its presentation here in isolation from the air operations of the Navy and Air Force enhances that record to the sure delight of Army air enthusiasts. The war is considered strictly from the surface point of view. The profesisonal airman is left to wonder just how Army aviation fitted into the overall air picture, or contributed to the tactical conduct of the war.

The array of heroic and unique incidents will entertain the layman lightplane fan. And Politella's statistics are sure to create the envy of the Navy and Air Force Korean flyers. One thousand and twenty-seven Army aviators served in Korea. Forty Army aircraft were lost to enemy action during the three years of combat flying while only six pilots turned up missing. The combat awards are equally amazing. The 1,027 Army aviators shared one Navy Cross, 723 DFC's and 8,483 Air Medals. Other decorations "to hundreds of Army Aviators . . ." included the Legion of Merit, Silver Star, Bronze Star and Purple Heart, etc. One thing sure, the Army of today loves its aviators, a far cry from the days of old.

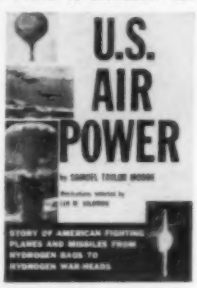
U. S. AIR POWER, by Samuel Taylor Moore, Col., USAF (Res-Ret), illustrated by Leo M. Solomon (Greenberg, $5.95).

This third, major one-volume history of American military airpower to appear within a year, covers Air Force, Navy and Marine aviation from the balloon to the nuclear ICBM.

Moore packs a broad subject into an illustrated narrative and does it well. He pulls no punches interpreting the men, decisions, equipment, strategy and operations which shaped the evolution and course of airpower.

On the one hand he believes failure to establish a single air service after WWI inhibited air development. On the other hand, he credits our "current balanced" overall air capability to the parceling of military air among all services. He cites, for example, the case of the Navy carrier weapons system. He believes the carrier would never have developed under a single air service, and praises carriers for decisive action in the war against Japan. At the same time, he accuses the Admirals of attempting to impede and strangle land-based airpower.

Moore's criticism in spots is caustic and falls where he feels it should. He maintains air leaders themselves cannot escape responsibility for fostering visions on strategic and tactical goals far beyond the technical capabilities of aircraft to perform.



The post WWII period suffers most, as contemporary history always does. His treatment of the years up to 1945 (and the years of Korea) provide a refreshing lookback drawn from deep hindsight, wide knowledge and personal experience.

ZENITH
"For safety's sake, every pilot should own a Navigator, and carry it with him every time he flies, particularly when IFR."
George Edgecumbe,
Piper Distributor, Elgin, Ill.

George Edgecumbe, Testing Navigator in new Comanche

NEW ZENITH 2-BAND All-Transistor Portable Radio performs where others fail!

DESIGNED TO GIVE PILOTS LONG DISTANCE STANDARD BROADCAST

PLUS 150-400 KC WEATHER-NAVIGATION BROADCASTS—

PLUS A SELF-POWERED STANDBY NAVIGATION INSTRUMENT

The Navigator®, Model Royal 760, is much more sensitive than comparable two-band transistor portables. Ideal for pilots who need long distance reception of both CAA weather and standard broadcast, while at home, driving to the airport, flying, stopping overnight, or on hunting and fishing trips.

Tuned RF stage and 3-gang condenser give superior selectivity and sensitivity, and minimize broadcast station interference on LF band. Four-inch Alnico 5 speaker and push-pull audio give superb tone quality and adequate volume in most planes (earphone also available at extra cost). Operates up to 350 hours on flashlight batteries.

As a standby navigation instrument, the Navigator® homes on broadcast and range stations and on LF beacons, with two ferrite, plate-type, loop antennas that give sharp null angle with characteristics of ADF loop. NAV switch eliminates AVC for build-and-fade orientation and sharp cone in instrument navigation of LF range. Azimuth scale for quick reading of relative bearings. Has sturdy top grain cowhide leather cabinet.

QUALITY BY
ZENITH
THE ROYALTY OF RADIO

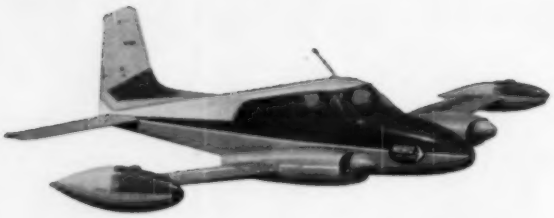
Write for full information and the name of your nearest Zenith distributor.

ZENITH RADIO CORPORATION, DEPT. NA
CHICAGO 39, ILLINOIS

Also makers of Television, High-Fidelity Instruments and fine Hearing Aids. 40 years of leadership in radionics exclusively.

YOU'VE RENTED HERTZ CARS FOR YEARS—

Now Hertz



Now *anyone* can enjoy the convenience of a private plane. You don't have to be a pilot (or a millionaire) to fly *when* and *where* you want—for a day, a week, a month! You can fly via commercial airline to the major city nearest your destination —save hours by flying the rest of the way in a Hertz Rent A Plane. This check list shows you how easy and economical it is to use Hertz Rent A Plane Service.

Planes shown above: Twin-engine Cessna 310B and single-engine Cessna 172

rents planes!

(WITH OR WITHOUT PILOT)

Q. How do I rent a plane from Hertz?

A. Call any of the Hertz Rent A Car or Hertz Rent A Plane offices listed in *alphabetical* phone books everywhere.

Q. In how many cities is Hertz Rent A Plane service available?

A. Presently in over 56 cities across the United States. Service is being expanded. (Franchises are available to reliable established operators in selected major cities.)

Q. How can I be sure of getting a Hertz Rent A Plane when and where I want it?

A. Your local Hertz office has up-to-the-minute listings of Hertz Rent A Plane services. Your call will assure a reservation.

Q. Do I have to be a pilot to rent a plane from Hertz?

A. No. Hertz can provide the services of an experienced pilot on its "Taxiplane" Plan.

Q. I am a pilot. What do I do?

A. On "Fly-Yourself" service, there is a check-out procedure. Apply to any Hertz Rent A Plane office or Hertz headquarters for added details.

$ $ $

Q. How much does it cost to rent a plane from Hertz?

A. If you are a pilot, the rental rate is as little as $1.50 an hour plus 13¢ a mile. If you require a pilot, rate is as little as $2.50 an hour plus 18¢ a mile, plus tax.

Q. Are there lower rates by the day or week?

A. Yes. In addition to a basic hourly rate—there are reduced rates for daily and weekly rentals.

Q. What is done to assure that planes rented from Hertz are in first class mechanical condition?

A. Hertz planes are current models. They are regularly inspected and maintained to rigid government specifications as set by the Civil Aeronautics Authority.

Q. Do insurance companies make any distinction in personal life insurance policies between the safety of commercial airline travel as compared to the safety of air-charter service?

A. No. A survey of leading insurance companies indicates that air travel has established such a good safety record that there are no special policy or premium limitations applicable for either commercial or charter air travel with a CAA certificated operator.

Q. About how much will it cost four of us to fly a 250 mile round-trip (500 miles total) in one day? I am a pilot.

A. In a Cessna 172 a typical daily rate is $18.00 plus 13¢ a mile. Total: about $83.00 or $20.75 apiece.

Q. How much will it cost for three of us to fly a 250 mile round-trip (500 mile total)? We will need a pilot.

A. In a Cessna 172 a typical daily rate with pilot is $30.00, plus 18¢ a mile, plus tax. Total: about $132.00 or $44.00 apiece.

Q. Are planes rented from Hertz fully equipped?

A. Yes! All planes have far more navigational and safety equipment than is required for cross country flying. All are equipped for takeoff and landing at any airport in the United States.

Q. What kind of planes does Hertz provide?

A. Only the finest, new single and twin-engine aircraft, such as Cessna 172's, 175's, 182's, and 310B's are provided by Hertz.

Q. How many passengers can a Hertz Rent A Plane accommodate?

A. Cessna 172, 175, 182 and similar single-engine aircraft—three passengers plus pilot. Cessna 310B and other twin-engine aircraft—four passengers plus pilot.

Q. What are the cruising speeds of Hertz Rent A Planes?

A. Cruising speeds vary by aircraft type and model, ranging from 110 to 190 miles per hour for single-engine planes, up to 235 miles per hour for twin-engine planes.

Q. How can Hertz Rent A Plane service save me time on a long trip?

A. Fly via commercial airline to the major city nearest your destination—save hours by flying the rest of the way in a Hertz Rent A Plane.

Q. Can I arrange to have a Rent A Plane meet me in another city?

A. Yes. A call to your local Hertz office will reserve a plane in most any city.

For further information please write Hertz Rent A Plane, 218 S. Wabash Ave., Chicago 4, Illinois

HERTZ RENT A PLANE

© 1958 Hertz Rent A Plane System, Inc.

Open Windows

GILL ROBB WILSON
Editor and Publisher

"I try to keep opening windows for his mind."

THE man was referring to his sixteen-year-old boy. The question had arisen of how the boy could profitably spend a summer vacation from preparatory school. The possibility of a few weeks of flight training and introduction to meteorology, aerodynamics, navigation and traffic considerations had suggested itself.

"It's not a matter of making a pilot of him," the man said, "so much as giving him opportunity for viewpoint."

Back yonder in the years the man himself had had such opportunity. Doubtless he was remembering that the experience had been a window. Certainly the man had seen out toward the future. He had gone on to become an internationally noted scientist and educator. Now he was seeking to evaluate opportunity for his boy. "I try to keep opening windows for his mind," he said.

Several weeks after this visit with a wise father, I was invited to participate in another window opening project. The Oklahoma Frontiers of Science Foundation gathered into Oklahoma City for a day some six thousand of the top flight youngsters of the state's High Schools. The co-operation of the State Board of Education, the USAF and Air Force Association, along with various components of the aircraft industry, was easily enlisted. Such as Donald Douglas, Jr., Dr. Reuben Mettler of Ramo-Wooldridge, Krafft Ehricke of Convair Astronautics, Dr. Dorothy Simon of Avco Research, and George Sutton of North America's Rocketdyne Division came to point out the scenery from the windows. The top echelon of Air Force science came too. The youngsters were given a preview of the years of their maturity —space flight, stellar exploration, global TV, controlled weather. Through the eyes of the biologist and chemist and physicist and metallurgist, they peered through the windows into the tomorrow.

It was a day to remember—an invitation to inherit not alone the earth but the universe.

"Your young men shall see visions and your old men shall dream dreams," I repeated to myself, recalling the indomitable faith in mankind expressed by a wise man long ago in the Book of Books.

And I remembered something else. I remembered that some short forty years ago a pair of wobbly wings had lifted up a restless, life-hungry, country boy of very meager talents and let him look down the decades ahead. I remembered that from then onward there had been zest and joy and a yardstick to measure the world. To be a part of a vibrant future that gave meaning to a treasured heritage was the best that could happen to a man. To find freedom and growth and God in one's own way and in one's own time gave meaning to life. And the years have been wonderful, wonderful, wonderful—not easy or crowned by great achievement—but wonderful.

"Why should I fly?" young men since then have asked me ten thousand times.

"Why should I encourage my son to fly?" a thousand worried parents have queried me.

"I try to keep opening windows for his mind," the wise man says.

And now I have a question, despite that editors should indulge in answers rather than interrogations.

Why, in the pattern of preparatory school education in the United States has not some one or more of our splendid institutions taken it upon themselves to sponsor a summer program of flight training for accredited young men from their ranks—not primarily to make pilots of them but to open windows to their minds? The prestige of such sponsorship would go far to set the space age in educational focus. Still of more value, it would indoctrinate some of our finest youth with a maturity of perspective essential to the survival of the things this nation stands for—freedom to be what one dreams he can be, opportunity to do what one feels he must do, vision to aspire to the stars and beyond.

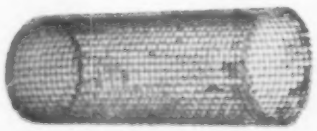
PLANE FAX

by STANDARD OIL COMPANY OF CALIFORNIA

1134 hours between majors—no repairs!

in photo and rescue work where dependable power is a must

"To be successful in our business — which includes low-altitude photo flights and aerial rescue work — you need two basic requirements: a good airplane and dependable fuels and lubricants," says Al Hudgin of Hudgin Air Service, Tucson, Arizona. "That's why we use Chevron Aviation Gasoline and RPM Aviation Oil Compounded in all our planes. Here's just one example of what I mean: We get exceptional service from a Lycoming 150 h.p. engine in our Piper-Tri Pacer. This engine gave top performance for 1134 hours between overhauls! On inspection, pistons showed no lacquer or varnish. Rings were completely free and clean. All oil screens were clear, too, and free of any deposits . . . engine condition was such that I feel it could have flown another several hundred hours." Al Hudgin sums up his satisfaction this way: "We're sold all over again on Chevron and RPM Aviation Products every time we service our engines. Their top condition gives us a wide safety margin against breakdown . . . for safer, more economical and dependable flying. That's what keeps us in business."



Typical piston and oil screen after 1134 flying hours on RPM Aviation Oil Compounded.

We take better care of your plane

CHEVRON AVIATION GASOLINE

AVIATION OILS RPM

T.M.'S "RPM," "CHEVRON," "PLANE FAX," REG. U.S. PAT. OFF.

THE SOVIET PILOT *is quite a fellow*

Encouraged as a child to pursue a career in aviation, he is honored, respected, highly trained and highly paid.

By R. E. STOCKWELL

AN AIR FORCE PILOT is quite a fellow in Russia. To the people, still steeped in the country's peasant-past, he is a daring defender, a protector from the hated invader. This, and the position afforded him by the Soviet state in the sociological scheme of things, make him an ideal long sought by the Russian masses—someone to look up to.

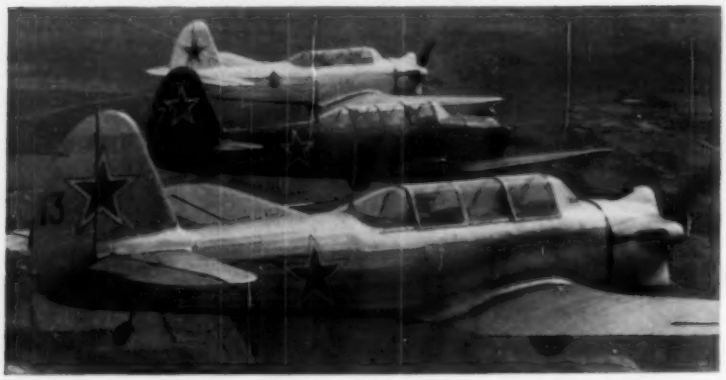
But for all the position his blue uniform assures him, the Soviet air force pilot has earned it. More than in any other country in the world, he has been pre-selected and molded to the abilities that give him the right to wear his uniform. This is not to say that he is superior as a pilot or a fighting man but it is to say that a greater effort has gone into making him what he is than in any other country.

It all begins when he is nine years old.

Then he is in the third grade, learning the multiplication tables. He also learns something about aircraft by cutting out and pasting together rather elaborate paper models of current designs. The best models win a prize and the very best in the land win a national prize and a place in the Air Museum in Moscow.

In the fourth grade the paper model is a further elaboration of scissors and paste-pot art, plus a careful paint job. And after that he will turn his model-building talents toward balsa wood, fabric and dope, plus small power-

Pilots of Chkalov Central Air Club of the USSR flying Yak-18 training planes, powered with 160-hp, M-11RFI radial engines.



Third year students of an aircraft-building school in Moscow listen intently to a lecture on aerodynamics.

plants similar to those found in model shops in America. Russian stores, and especially the new children's store in Moscow, offer many types of do-it-yourself kits so that Soviet youngsters of all ages can assemble their own aircraft models, radios, and so on.

Between the ages of nine and 14, the Soviet youth will be encouraged to seek his natural interests through the Young Pioneers organization, which has chapters throughout the land.

The Young Pioneers flourish especially in the larger cities, such as Leningrad, where they have a great hall or palace as they prefer to call it, on famous Nevsky Prospect, the city's main street. Here extra-curricular activities are carried on at state expense, with opportunities to become familiar with such things as radio communications, handling of boats, elementary navigation, and many types of model building.

In contrast to what he must study in the schoolroom, the Soviet youth finds in the Young Pioneers an outlet for his natural bents, and may pursue them to the depths of his talent, interest and aptitude. Through the Young Pioneers he also may learn to swim, to take part in organized sports, and see different parts of the country while on organized tours set up during vacation periods. He wears a special uniform, a white shirt with red neckerchief. In summer, large groups of Young Pioneers can be seen touring the Kremlin and the tomb of Lenin and Stalin in Moscow. Retired military officers, school teachers and others give their time and talent to the organization.

By the time he is 14 and has completed the elementary seven years of schooling (Russia is only now expanding to ten years its elementary training before college), the Soviet Ministry of Education will have a pretty good idea of a young man's or woman's prospect for science, industry, teaching, the armed forces, or what have you? Of course, the best individuals in terms of aptitude and inclination are encouraged to go on to higher institutions of learning, where they are exempt from military service. The cost of their education is guaranteed by the state.

Those with an inclination for aviation, whatever their lot after elementary school, are encouraged to take part in DOSAAF activities. This is the Volunteer Cooperative Society of the Armed Forces of the USSR, and as the title implies, it is a paramilitary organization with chapters everywhere in Russia. DOSAAF is especially strong in industry (even a tea packaging plant in Tiflis that I visited had a room set aside for its DOSAAF Chapter), but only in recent years has it gained real strength on the collective and state farms, and in the machine tractor stations. Country folk in Russia are inclined to react rather slowly to organizational activities pushed from Moscow.

DOSAAF traces its origins back more than 30 years to January 23, 1927, when an organization called Osoaviakhim, a Federation of Societies for Promoting Defense and Developing the Aircraft and Chemical Industries of the USSR, was formed. A voluntary organization at first, it had genuine popular appeal and support. Soon it had an extensive national network of rifle clubs, study circles devoted to simple military problems, pilot training, parachute jumping, and sports activities. As a sideline, it also collected "public funds for building planes, dirigibles, hangars and airfields."

Over the years the organization underwent many changes, and at one time there were three public societies —one each for the Navy, Army and Air Force. Unification of the armed services and their supporting organizations has been a problem in Russia as well as in the United States, but in recent years paramilitary activities of all types have been carried on by one organization, DOSAAF.

DOSAAF gets most of its support from public contributions, collected in factories and on farms with an efficiency similar to Community Chest payroll deductions in the United States. The drive for membership is continuous, but has been especially active since Stalin's death. As a result, "DOSAAF's membership doubled from 1954 to 1957," according to Lt. Gen. S. Shatilov, the first vice-chairman of the Central Committee of DOSAAF.

"In circles, clubs and courses its members obtain training as pilots, parachutists, radio operators, motorcyclists, auto and tractor drivers, mechanics and helmsmen. In thousands of sports groups our young people practice shooting, driving motorcycling and other useful sports and acquire the stamina, daring, skill and self-reliance necessary for both work and fighting. Sportsmen of the society have set dozens of Union and world records in parachuting, gliding and airplane model competitions. DOSAAF does an important job in training the public in air-raid and chemical defense against new means of attack. DOSAAF also operates the lifeguard and rescue service, protecting the lives of people on rivers and lakes and at the seashore."

Most DOSAAF members are between the ages of 14 and 20. During those years they are inducted into the armed services. If they have special DOSAAF training as pilots, radio operators, or in parachute jumping, this likely will determine the branch of service in which they end up. Thus DOSAAF serves well to start young Soviets in that service to which they are best suited and in which they have the greatest interest. (*Continued on page 54*)

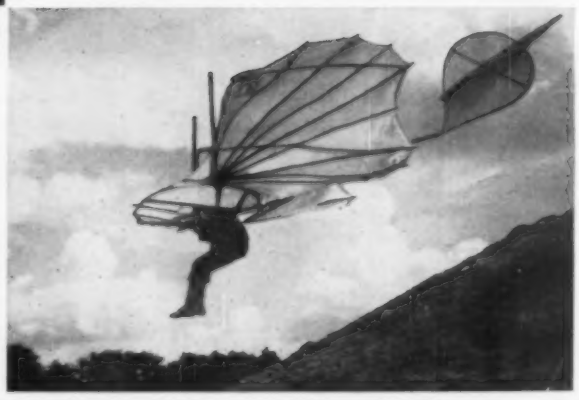
The most vital step in man's mastery of the air was taken by a man who lived and died to prove his theory of flight.

Pioneer of Pioneers

By HARRY HARPER

Lilienthal about ready to glide like a bird.

Otto Lilienthal—the world owes him a debt of gratitude.



Supported by artificial wings and balancing himself by movements of his arms and legs, the "bird-man," comes gliding down.

EVERYONE KNEW THERE were witches, but witches, in Anklam—unthinkable. "It flew away from the hillside," Frau Nederhoeft reiterated. "I saw it with my own eyes—a man-bird!"

The "witch" was young Otto Lilienthal who, with his brother Gustav, had fashioned a pair of wooden wings overlaid with feathers. When this became known, the burgemeister demanded, "What is the meaning of this outrage, Otto Lilienthal? Scaring good people!"

"Herr Burgemeister, I truly make wings and I try to fly like the birds."

Herr Pfundheller admonished, "Do not frighten any more womenfolk and children! If I see you once more imitating a witch, I will put you among the insane!"

Nevertheless the next week end, from a hill four miles from their village, Otto and Gustav made their second attempt to get Otto airborne. The two boys had now cut willow rods and collected two bags of goose feathers. They peeled and wove the rods to make a framework and bound the feathers along the rods.

When the artificial wings were completed, the two boys surveyed the area to ensure that no one was there to report witchcraft. While Gustav kept watch, Otto ran as fast as he could along the ridge, hopping furiously in an effort to make himself airborne. He fell violently time and again. The wings would not hold him up.

"You can't leap fast enough," Gustav hazarded that evening when he and Otto had hidden the surfaces and were walking homeward.

"No, I think it lies in the way we shaped the wings," Otto demurred. During that summer the boys experimented with artificial "birds" which they contrived. From upper story windows of their home they glided these birds and studied their sweeping descent.

In a few weeks however, the brothers were parted, with Gustav off to become an architect and Otto to an engineering college where, in spite of the rigors of his studies, he never ceased to speculate on human flight. He was convinced that man could fly. In one of his letters to Gustav, Otto wrote, "To design a flying apparatus is nothing. To build one is little. It is to learn to fly one that is everything."

Otto's progress as an engineer was swift. Upon gradua-

Lilienthal riding the wind after launching himself from his artificial hill on the outskirts of Berlin.

tion, he opened his own business in Berlin and established a private workshop where he could experiment. He discarded one idea after another until one day a set of revolutionary blueprints lay before him. Gustav, who came to visit him, inspected the blueprints and shook his head. "I have no doubt," he said, "that you will get off the ground with this design but, if anything goes wrong in the air, you will be killed. And you have drawn a hill in your plans. There is no such hill in all Germany."

Otto grinned. "There soon will be," he said, "I am building one."

In his workshop he showed Gustav a small revolving arm mechanism he had designed and linked to instruments to make accurate recording of the performance of miniature wings of various sizes and shapes. His object at the moment was to construct man-lifting gliders to soar from his artificial hill. "If I stand on top of the hill," he told Gustav, "face directly into the wind, and then run, the downward grade of the hill will make it possible for me to get up enough speed on foot to launch myself into a glide."

"If you become airborne and rise to a great height, you will need a method of returning to earth without crashing. If you crash, you will be injured," his brother argued.

"I'll deal with one thing at a time," Otto said. "Let me find out how to become airborne; afterwards I shall find out how to return to earth."

Gustav shook his head. "You should work the other way; learn to land and then how to fly. The first is the more dangerous of the two."

German peasants on the outskirts of Berlin stared in amazement a few weeks later when they first saw a weird figure on a cone-shaped mound. The figure had the body of a man, but wings like a gigantic bird. The bird-man began to run at top speed down the hillside. His hands grasped a long crossbar connected to the wings. A gust swept up the hillside and the man with the wings shot into the air. Gustav and three other spectators gasped as they saw him swept upwards. It seemed that the bird-man had at last solved the secret of flying, for he was now drifting backwards with the wind, over the heads of spectators.

Then, suddenly, the wind subsided. Lilienthal had calculated on this. He swung the weight of his legs backwards and tilted his wings forward, swooping down in the way he had seen hawks swoop on their prey. But he swooped too fast. The horrified spectators waited for a fatal crash. Instead he timed the dive to a split second, swung his legs forward, tilted his wings until they acted as an airbrake and alighted within a few feet of the point from which he had taken off.

Breathless and excited at this first success, Lilienthal waited for the wind to grow again to sufficient strength, again raced down the hill and again became airborne. Then something went wrong. As he glided with his legs pulled up, he turned over on his back. Convulsively he shifted his weight to regain his equilibrium, but the gradual descent became a headlong fall and his wings failed to check it. The man-bird crashed to the ground with a tearing of fabric and splintering (*Continued on page* 56)

THE IDAHO–MEXICO ANNUAL TOUR

By PETER GUEST

WHEN YOU'VE HAD a bellyful of winter and blizzard, you daydream of basking in the sun along sandy beaches, matching brawn with the sporting sailfish, and eating watermelon for breakfast every morning.

Idaho's seventh annual mid-winter aerial tour to Mexico, sponsored by the Idaho State Department of Aeronautics, laid that luxury on-the-line for 104 participants traveling in 34 personally-owned aircraft during February of this year—visiting Hermosillo, Guadalajara, Mexico City, Acapulco, Manzanillo, and Mazatlan.

When these tours were first organized by Idaho Aeronautics Director, Chet Moulton, they were strictly stag affairs with deep sea fishing the prime goal of participants. This has changed—in 1958, 70 of the 104 participants were husband-and-wife combinations bent on seeing the country, learning the customs and making a wonderful vacation out of the trip. Many a wife has learned to enjoy the use of the family airplane and in more instances than not, is the one looking ahead and planning for next year.

A safety feature of Idaho's mid-winter tours to Mexico and summer jaunts to Canada is the controlled supervision wherein all aircraft are rostered in the order of their speed with "slowest craft first off—fastest last." This assures a constant overtaking and bunching of aircraft at each destination which prompts good humor, exchange of enroute experiences and good fellowship.

The Department employs for the tour one of the best A & E's it can obtain and carries in its Cessna 195 a copious supply of spare parts. Delbert McNees of Bradley Field in Boise accompanied the 1957 and '58 flights—taking over the detail of refueling and minor repairs enroute.

St. George, Utah, known as the "Dixieland-of-the-North" because it was the first area designated during civil war times to grow needed cotton for the Union, was again selected as "assembly-rendezvous" for the group, since it is located far enough south to alleviate winter weather considerations. The St. George Chamber of Commerce has a reputation with Idaho flyers as the most hospitable little city in the west. Scheduled tour participants began arriving two and three days early to assure no delay by inclement weather. President Sampson and several others were constantly at the airport—greeting new arrivals, ferrying them to assigned motels, arranging for cost-free side trips to Snow Canyon, Zion Canyon, and other points of interest.

After a bit of switching luggage here and there, the

Above and opposite page: Idaho-Mexico Tour's 34 aircraft tied down at Manzanillo Airport, which is surrounded by coconut palms.

Wonderful Mexican hospitality, warm sunshine, fine fishing and congenial company lure more pilots every year on this mass flight south of the border.

At the fishermen's docks at Acapulco.

group was off on February 17th for its first day's destination, the official "port of entry," Hermosillo, Sonora, Mexico. Here the group enjoyed one of the last festive days of "Carnival Time" and dining in the open on the veranda cafe of the Hotel San Alberto which is managed by affable Cesar Gandara.

After seven years of crossing the border with large groups, several time-saving procedures have been learned. One of these is the mimeographing of a form to incorporate all the information required by Mexican Customs and Immigration officials, and sending this material ahead several days in advance with the $3 permit fee. In so doing, tourist permits are already made up and hours of in-line waiting is alleviated to the joy of all concerned.

Another item Moulton has been stressing to Mexican aeronautical officials is the possibility of flight plans and landing-fee forms printed in the languages of both Mexico and the United States, as well as a special tour permit to groups of a pre-determined number of aircraft, which will enable the tour leader to file one flight plan for the entire group of aircraft provided a printed listing of pilot, passengers, address, aircraft make and identification number is submitted. This in itself will save several procedural hours a day to tour groups.

From Hermosillo to Guadalajara, 800 miles, was the

Left: Guided tour of old Aztec ruins near the pyramids north of Mexico City.

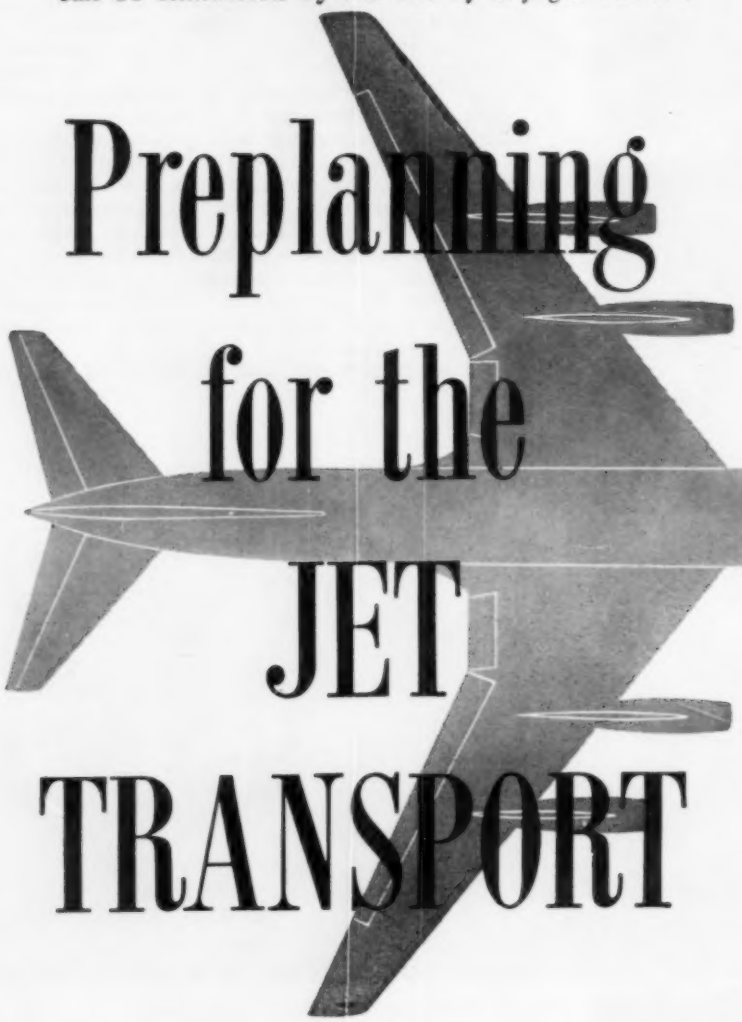
Left: The largest coconut plantation in Colima served a drink of coconut milk.

group's longest day. Perhaps not so hard a day for one or two aircraft but when you consider it takes from five to 15 minutes fueling time per aircraft from either pump or barrels and multiply that by 34, every fueling stop consumed a total elapsed time of three to six hours.

In Guadalajara, the group put up for two days at the Hotel Fenix and used the services of the Hecht Travel Service. Most of the group felt this to be one of the most colorful cities enroute with good hospitality everywhere in evidence. Travel tours took in the Jalisco Fair, cock fights, glass factory where eight- to 12-year-old boys learn the trade of glass-blowing during (*Continued on page 73*)

Some of the maintenance problems that may be anticipated with the advent of jet airliner operation can be eliminated by the use of in-flight checks.

Preplanning for the JET TRANSPORT



By W. HOWARD HILL
Maintenance Engineer, CONVAIR

TIME DRAWS NEAR when passengers will be climbing aboard the jets. New standards of speed and comfort will be theirs. Anyone who hasn't yet experienced the luxury of zipping along in the firetails has a rare treat in store. It's a whole new era in travel.

But this is for sure: To make the big luxury liners pay off, the operators of them will have to do some tall thinking ahead. This thinking will have many ramifications and books would be needed even to mention them all. We can, however, cite one with which we are intimately familiar and perhaps one will be enough to stimulate the reader's mind to the vast range of others.

Consider then that a one-minute delay for maintenance of a jet airliner sitting on the ramp ready to go can be equivalent to 800 passenger-seat miles! In airline competition, where service and dependability is the key to patronage, the operator with the best trouble-free record is going to garner the sheaves. Minutes saved in maintenance will be translatable into millions of dollars. A major airline official, using conventional equipment, has estimated that, if he could halve the delays of his company due to electronic failure, he would be more than seven million passenger-seat miles ahead of the game!

Currently, average maintenance delays subdivide as follows: 50 per cent powerplant; 20 per cent electrical, electronic and instrument systems; 30 per cent all other aircraft systems. With the jets, these averages will change. It is estimated that the powerplant share of maintenance delay will drop to 20 per cent; the electric, electronic and instrumentation share will rise to 40 per cent; and all other systems will rise likewise to 40 per cent.

The problem in part is therefore posed—how to tackle and reduce the possibility of maintenance delay caused by electronic systems?

The pat answer is to build test facilities into the equipment or the aircraft. If this could be done, it would save vast delay and millions of man hours in trouble shooting. But some questions must first be answered.

1. Would building the test equipment into the electronic systems complicate them?

Let's look at an example. The automatic direction finder (ADF) system can now be tested through the function switch on the control panel. By setting it in the loop position, the antenna position, and the ADF position, and performing various checks, one can determine which component of the entire system has failed. In the Omni

system also, one can run some checks to determine what component is at fault but can not run a complete system check.

2. Who would perform in-flight tests? Probably the flight engineers—if the tests are not too complicated and do not require too much time.

3. What additional costs and weight would be necessary to provide in-flight tests? A firm answer depends upon the equipment manufacturers rather than the airframe builders but, here at Convair, we feel that the weight increase would be slight and that reasonable costs would be more than offset by reduction in delay caused by ground maintenance time.

It is proposed that any one or a combination of the following methods would provide for the isolation of in-flight component malfunction:

(a) Installation of test jacks in the front of components to enable personnel to check for faulty units.

(b) Installation of test meters and function switches.

(c) Addition of test panels on the aircraft flight deck for remote testing of electrical, electronic, or instrument components.

(d) Provision for functions or control panels for system check-out.

There are several advantages to in-flight checks. Replaceable components of a failed system could be determined prior to landing; ground maintenance personnel could be at the ramp with replacements for the faulty equipment when the aircraft landed; failed components could be determined rapidly on the ground and thus reduce delays. Troubles that show up only in flight could be analyzed and passed on to maintenance. The number of units pulled which might prove to have no malfunction would be greatly reduced.

To determine whether in-flight tests were all that we claimed, Convair developed an in-flight trouble-shooting chart (Chart 1), which provides a simple check list for flight personnel and a form which will enable them to give a brief description of component troubles to ground maintenance crews via the plane's radio. If the system has no troubles, all answers on Chart 1 will be "yes." Ground maintenance personnel will be interested only when the equipment has not performed as indicated on the chart. These malfunctions will be indicated by "no" checks on the chart.

Let us assume a malfunction of the loop in the radio compass system, which has five components. In checking the system with the chart, you find that the indicator will not seek the station in the ADF position, so you check the (*Continued on page 82.*)

CHART I

CODE I - RADIO COMPASS (ADF) IN-FLIGHT TROUBLE SHOOTING CHART

FLIGHT ENGINEER _____ FLIGHT NO. _____ SYSTEM NO. _____

	CHECK ONE YES	NO
I. FAILURE TO START OR TURN ON		
A. Was circuit breaker set?	☐	☐
A1. Did circuit breaker remain set?	☐	☐
B. Was fuse OK?	☐	☐
B1. Did fuse blow again?	☐	☐
C. If function switch is in ant., loop, or ADF position and tuning dial is moved, does tuning meter vary and is audio tone present?	☐	☐
II. CHECK FOR HOMING CAPABILITIES		
NOTE - Set function switch to ADF position. A. Does pointer on ADF indicator seek station heading?	☐	☐
NOTE - Set function switch to ant. position. B. Is audio signal present?	☐	☐
NOTE - Set function switch to loop position. C. Is audio signal present?	☐	☐
III. CHECK FOR INDICATOR OPERATION		
NOTE - Set function switch to loop position and check the following: A. Does pointer on ADF indicator rotate when loop switch is moved to left or right?	☐	☐
B. Does tuning meter vary when loop is rotated?	☐	☐
IV. CHECK FOR BAND OPERATION		
NOTE - Pick a station in each of the following frequency ranges: A. Frequency 90 to 200 KC: Is audio and BFO present?	☐	☐
B. Frequency 200 to 400 KC: Is audio and BFO present?	☐	☐
C. Frequency 400 to 900 KC: Is audio and BFO present?	☐	☐
D. Frequency 900 to 1800 KC: Is audio and BFO present?	☐	☐
E. Check BFO by selecting a station and tuning to maximum on tuning meter. Throw BFO switch to ON position. Is beat note present?	☐	☐

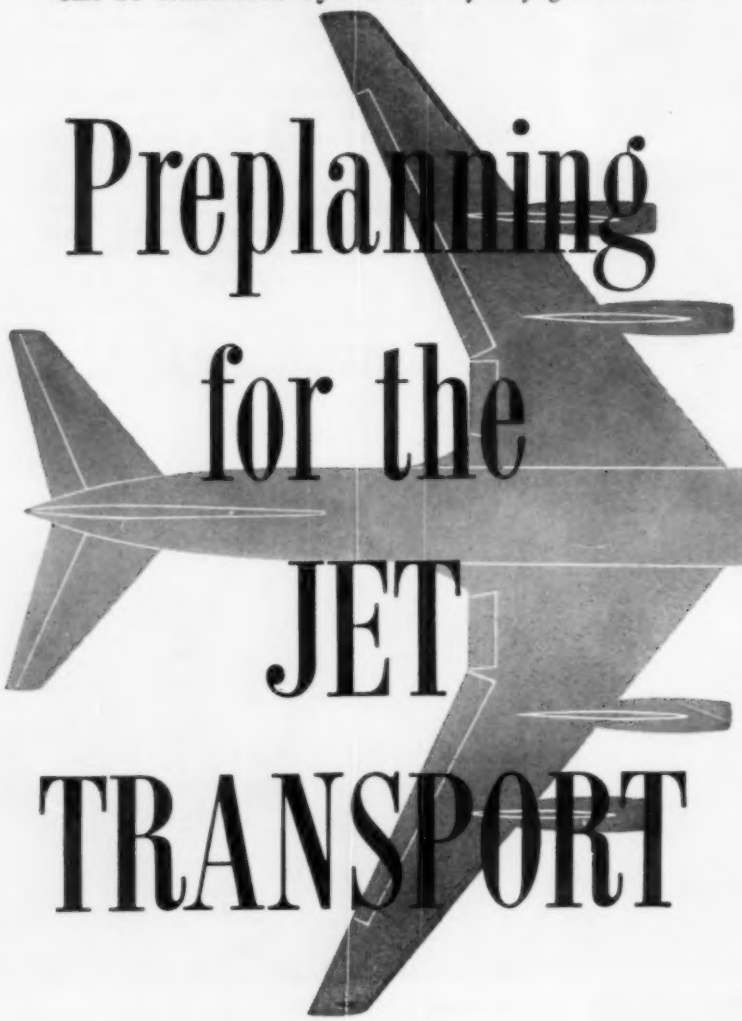
CHART 2

RADIO COMPASS (ADF) TROUBLE SHOOTING ANALYSIS SHEET

QUESTIONS	STEP #1	STEP #2	STEP #3
I. FAILURE TO START OR TURN ON.			
A. WAS CIRCUIT BREAKER SET? A1. DID CIRCUIT BREAKER REMAIN SET?	IF CIRCUIT BREAKER WAS OPEN AND AFTER RESET IT OPENED AGAIN, A POSSIBLE RECEIVER SHORT IS INDICATED. REPLACE RECEIVER.	REMOVE RECEIVER. THEN RESET CIRCUIT BREAKER. IF BREAKER OPENS, FAULT IS IN SHIP'S WIRING. CHECK WIRING FROM CIRCUIT BREAKER PANEL TO RECEIVER.	IF CIRCUIT BREAKER DOES NOT OPEN, SHORT IS IN RECEIVER. REPLACE RECEIVER.
B. WAS FUSE OK? B1. DID FUSE BLOW AGAIN?	IF FUSE WAS BLOWN AND BLEW AGAIN AFTER REPLACEMENT, SHORT IN RECEIVER IS INDICATED. REPLACE RECEIVER.	REMOVE RECEIVER AND REPLACE FUSE. IF FUSE BLOWS, FAULT IS IN SHIP'S WIRING. CHECK WIRING FROM FUSE PANEL TO RECEIVER.	IF FUSE DID NOT BLOW, SHORT IS IN RECEIVER. REPLACE RECEIVER.
C. IF FUNCTION SWITCH IS IN ANT., LOOP, OR ADF POSITION AND TUNING DIAL IS MOVED, DOES TUNING METER VARY AND IS AUDIO TONE PRESENT?	IF TUNING METER DOES NOT VARY AND NO AUDIO TONE IS PRESENT, POWER IS NOT PRESENT IN RECEIVER. REPLACE RECEIVER.	IF TUNING METER DOES NOT VARY BUT AUDIO TONE IS PRESENT, CONTROL PANEL IS FAULTY. REPLACE CONTROL PANEL.	
II. CHECK FOR HOMING POSSIBILITIES.			
(NOTE: SET FUNCTION SWITCH TO ADF POSITION.) A. DOES POINTER ON ADF INDICATOR SEEK STATION HEADING?	IF POINTER DOES NOT SEEK STATION, SIGNAL IS NOT BEING RECEIVED ON ANT. OR LOOP. SEE STEPS B OR C.		
(NOTE: SET FUNCTION SWITCH TO ANT. POSITION.) B. IS AUDIO SIGNAL PRESENT?	IF NO AUDIO SIGNAL IS PRESENT, SENSE ANT. MAY BE OPEN. SEE STEPS C AND D.	IF SENSE ANT., CHECK LEAD. LEAD LEADS AND FITTINGS SHOULD BE CHECKED.	IF NO AUDIO SIGNAL IS PRESENT AFTER STEPS C AND D HAVE BEEN ENGAGED, RECEIVER IS AT FAULT. REPLACE RECEIVER.
(NOTE: SET FUNCTION SWITCH TO LOOP POSITION.) C. IS AUDIO SIGNAL PRESENT?	IF NO AUDIO SIGNAL IS PRESENT, LOOP ANT. MAY BE FAULTY. REPLACE LOOP ANT.	IF NO AUDIO SIGNAL IS PRESENT AFTER LOOP IS CHANGED, WIRING BETWEEN LOOP AND RECEIVER SHOULD BE CHECKED.	IF NO AUDIO SIGNAL IS PRESENT AFTER STEPS C AND D HAVE BEEN CHECKED, RECEIVER IS AT FAULT. REPLACE RECEIVER.
III. CHECK FOR ADF INDICATOR OPERATION.			
(NOTE: SET FUNCTION SWITCH TO LOOP POSITION AND CHECK THE FOLLOWING:) A. DOES POINTER ON ADF INDICATOR ROTATE WHEN LOOP SWITCH IS MOVED TO LEFT OR RIGHT?	IF POINTER DOES NOT ROTATE BUT TUNING METER VARIES, INDICATOR IS AT FAULT. REPLACE INDICATOR.	IF POINTER DOES NOT ROTATE AND TUNING METER DOES NOT VARY, RECEIVER IS AT FAULT. REPLACE RECEIVER.	
B. DOES TUNING METER VARY WHEN LOOP IS ROTATED?	IF POINTER ROTATED WHEN MANUAL LOOP SWITCH WAS MOVED AND TUNING METER DOES NOT VARY, LOOP IS AT FAULT. REPLACE LOOP.		
IV. CHECK FOR BAND OPERATION.			
(NOTE: PICK A STATION IN EACH OF THE FOLLOWING FREQUENCY RANGES:) A. FREQUENCY 90 TO 200 KC: IS AUDIO AND BFO PRESENT?	RECEIVER SHOULD BE CHANGED IF IT FAILS TO RESPOND TO EITHER AUDIO OR BFO DURING ANY ONE OF THESE CHECKS.		
B. FREQUENCY 200 TO 400 KC: IS AUDIO AND BFO PRESENT?			
C. FREQUENCY 400 TO 900 KC: IS AUDIO AND BFO PRESENT?			
D. FREQUENCY 900 TO 1800 KC: IS AUDIO AND BFO PRESENT?			
E. CHECK BFO BY SELECTING A STATION AND TUNING TO MAXIMUM ON TUNING METER. THROW BFO SWITCH TO ON POSITION. IS BEAT NOTE PRESENT?			

Some of the maintenance problems that may be anticipated with the advent of jet airliner operation can be eliminated by the use of in-flight checks.

Preplanning for the JET TRANSPORT



By W. HOWARD HILL
Maintenance Engineer, CONVAIR

TIME DRAWS NEAR when passengers will be climbing aboard the jets. New standards of speed and comfort will be theirs. Anyone who hasn't yet experienced the luxury of zipping along in the firetails has a rare treat in store. It's a whole new era in travel.

But this is for sure: To make the big luxury liners pay off, the operators of them will have to do some tall thinking ahead. This thinking will have many ramifications and books would be needed even to mention them all. We can, however, cite one with which we are intimately familiar and perhaps one will be enough to stimulate the reader's mind to the vast range of others.

Consider then that a one-minute delay for maintenance of a jet airliner sitting on the ramp ready to go can be equivalent to 800 passenger-seat miles! In airline competition, where service and dependability is the key to patronage, the operator with the best trouble-free record is going to garner the sheaves. Minutes saved in maintenance will be translatable into millions of dollars. A major airline official, using conventional equipment, has estimated that, if he could halve the delays of his company due to electronic failure, he would be more than seven million passenger-seat miles ahead of the game!

Currently, average maintenance delays subdivide as follows: 50 per cent powerplant; 20 per cent electrical, electronic and instrument systems; 30 per cent all other aircraft systems. With the jets, these averages will change. It is estimated that the powerplant share of maintenance delay will drop to 20 per cent; the electric, electronic and instrumentation share will rise to 40 per cent; and all other systems will rise likewise to 40 per cent.

The problem in part is therefore posed—how to tackle and reduce the possibility of maintenance delay caused by electronic systems?

The pat answer is to build test facilities into the equipment or the aircraft. If this could be done, it would save vast delay and millions of man hours in trouble shooting. But some questions must first be answered.

1. Would building the test equipment into the electronic systems complicate them?

Let's look at an example. The automatic direction finder (ADF) system can now be tested through the function switch on the control panel. By setting it in the loop position, the antenna position, and the ADF position, and performing various checks, one can determine which component of the entire system has failed. In the Omni

system also, one can run some checks to determine what component is at fault but can not run a complete system check.

2. Who would perform in-flight tests? Probably the flight engineers—if the tests are not too complicated and do not require too much time.

3. What additional costs and weight would be necessary to provide in-flight tests? A firm answer depends upon the equipment manufacturers rather than the airframe builders but, here at Convair, we feel that the weight increase would be slight and that reasonable costs would be more than offset by reduction in delay caused by ground maintenance time.

It is proposed that any one or a combination of the following methods would provide for the isolation of in-flight component malfunction:

(a) Installation of test jacks in the front of components to enable personnel to check for faulty units.

(b) Installation of test meters and function switches.

(c) Addition of test panels on the aircraft flight deck for remote testing of electrical, electronic, or instrument components.

(d) Provision for functions or control panels for system check-out.

There are several advantages to in-flight checks. Replaceable components of a failed system could be determined prior to landing; ground maintenance personnel could be at the ramp with replacements for the faulty equipment when the aircraft landed; failed components could be determined rapidly on the ground and thus reduce delays. Troubles that show up only in flight could be analyzed and passed on to maintenance. The number of units pulled which might prove to have no malfunction would be greatly reduced.

To determine whether in-flight tests were all that we claimed, Convair developed an in-flight trouble-shooting chart (Chart 1), which provides a simple check list for flight personnel and a form which will enable them to give a brief description of component troubles to ground maintenance crews via the plane's radio. If the system has no troubles, all answers on Chart 1 will be "yes." Ground maintenance personnel will be interested only when the equipment has not performed as indicated on the chart. These malfunctions will be indicated by "no" checks on the chart.

Let us assume a malfunction of the loop in the radio compass system, which has five components. In checking the system with the chart, you find that the indicator will not seek the station in the ADF position, so you check the (*Continued on page 82.*)

CHART I

CODE I - RADIO COMPASS (ADF) IN-FLIGHT TROUBLE SHOOTING CHART

FLIGHT ENGINEER FLIGHT NO. SYSTEM NO.

	CHECK ONE YES	NO
I. FAILURE TO START OR TURN ON		
A. Was circuit breaker set?	☐	☐
A1. Did circuit breaker remain set?	☐	☐
B. Was fuse OK?	☐	☐
B1. Did fuse blow again?	☐	☐
C. If function switch is in ant., loop, or ADF position and tuning dial is moved, does tuning meter vary and is audio tone present?	☐	☐
II. CHECK FOR HOMING CAPABILITIES		
NOTE - Set function switch to ADF position. A. Does pointer on ADF indicator seek station heading?	☐	☐
NOTE - Set function switch to ant. position. B. Is audio signal present?	☐	☐
NOTE - Set function switch to loop position. C. Is audio signal present?	☐	☐
III. CHECK FOR INDICATOR OPERATION		
NOTE - Set function switch to loop position and check the following: A. Does pointer on ADF indicator rotate when loop switch is moved to left or right?	☐	☐
B. Does tuning meter vary when loop is rotated?	☐	☐
IV. CHECK FOR BAND OPERATION		
NOTE - Pick a station in each of the following frequency ranges: A. Frequency 90 to 200 KC: Is audio and BFO present?	☐	☐
B. Frequency 200 to 400 KC: Is audio and BFO present?	☐	☐
C. Frequency 400 to 900 KC: Is audio and BFO present?	☐	☐
D. Frequency 900 to 1800 KC: Is audio and BFO present?	☐	☐
E. Check BFO by selecting a station and tuning to maximum on tuning meter. Throw BFO switch to ON position. Is beat note present?	☐	☐

CHART 2

RADIO COMPASS (ADF) TROUBLE SHOOTING ANALYSIS SHEET

QUESTIONS	STEP #1	STEP #2	STEP #3
I. FAILURE TO START OR TURN ON.			
A. WAS CIRCUIT BREAKER SET? A1. DID CIRCUIT BREAKER REMAIN SET?	IF CIRCUIT BREAKER WAS OPEN AND AFTER RESET IT OPENED AGAIN, A POSSIBLE RECEIVER SHORT IS INDICATED. REPLACE RECEIVER.	REMOVE RECEIVER. THEN RESET CIRCUIT BREAKER. IF BREAKER OPENS, FAULT IS IN SHIP'S WIRING. CHECK WIRING FROM CIRCUIT BREAKER PANEL TO RECEIVER.	IF CIRCUIT BREAKER DOES NOT OPEN, SHORT IS IN RECEIVER. REPLACE RECEIVER.
B. WAS FUSE OK? B1. DID FUSE BLOW AGAIN?	IF FUSE WAS BLOWN AND BLEW AGAIN AFTER REPLACEMENT, SHORT IN RECEIVER IS INDICATED. REPLACE RECEIVER.	REMOVE RECEIVER AND REPLACE FUSE. IF FUSE BLOWS, FAULT IS IN SHIP'S WIRE. CHECK WIRING FROM FUSE PANEL TO RECEIVER.	IF FUSE DID NOT BLOW, SHORT IS IN RECEIVER. REPLACE RECEIVER.
C. IF FUNCTION SWITCH IS IN ANT., LOOP, OR ADF POSITION AND TUNING DIAL IS MOVED, DOES TUNING METER VARY AND IS AUDIO TONE PRESENT?	IF TUNING METER DOES NOT VARY AND NO AUDIO TONE IS PRESENT, POWER IS NOT PRESENT IN RECEIVER. REPLACE RECEIVER.	IF TUNING METER DOES NOT VARY BUT AUDIO TONE IS PRESENT, CONTROL PANEL IS FAULTY. REPLACE CONTROL PANEL.	
II. CHECK FOR HOMING POSSIBILITIES.			
(NOTE: SET FUNCTION SWITCH TO ADF POSITION.) A. DOES POINTER ON ADF INDICATOR SEEK STATION HEADING?	IF POINTER DOES NOT SEEK STATION, SIGNAL IS NOT BEING RECEIVED ON ANT. OR LOOP. SEE STEPS 2 OR 3.		
(NOTE: SET FUNCTION SWITCH TO ANT. POSITION.) B. IS AUDIO SIGNAL PRESENT?	IF NO AUDIO SIGNAL IS PRESENT, SENSE ANT. MAY BE OPEN. SEE STEPS 2 AND 3.	IF SENSE ANT., CHECK L.I.N. LEAD AND PITTMAN SHOULD BE CHECKED.	IF NO AUDIO SIGNAL IS PRESENT AFTER STEPS 1 AND 2 HAVE BEEN CHECKED, RECEIVER IS AT FAULT. REPLACE RECEIVER.
(NOTE: SET FUNCTION SWITCH TO LOOP POSITION.) C. IS AUDIO SIGNAL PRESENT?	IF NO AUDIO SIGNAL IS PRESENT, LOOP ANT. MAY BE FAULTY. REPLACE LOOP ANT.	IF NO AUDIO SIGNAL IS PRESENT AFTER LOOP IS CHANGED, WIRING BETWEEN LOOP AND RECEIVER SHOULD BE CHECKED.	IF NO AUDIO SIGNAL IS PRESENT AFTER STEPS 1 AND 2 HAVE BEEN CHECKED, RECEIVER IS AT FAULT. REPLACE RECEIVER.
III. CHECK FOR ADF INDICATOR OPERATION.			
(NOTE: SET FUNCTION SWITCH TO LOOP POSITION AND CHECK THE FOLLOWING:) A. DOES POINTER ON ADF INDICATOR ROTATE WHEN LOOP SWITCH IS MOVED TO LEFT OR RIGHT?	IF POINTER DOES NOT ROTATE BUT TUNING METER VARIES, INDICATOR IS AT FAULT. REPLACE INDICATOR.	IF POINTER DOES NOT ROTATE AND TUNING METER DOES NOT VARY, RECEIVER IS AT FAULT. REPLACE RECEIVER.	
B. DOES TUNING METER VARY WHEN LOOP IS ROTATED?	IF POINTER ROTATES WHEN MANUAL LOOP SWITCH WAS MOVED AND TUNING METER DOES NOT VARY, LOOP IS AT FAULT. REPLACE LOOP.		
IV. CHECK FOR BAND OPERATION.			
(NOTE: PICK A STATION IN EACH OF THE FOLLOWING FREQUENCY RANGES:) A. FREQUENCY 90 TO 200 KC: IS AUDIO AND BFO PRESENT?	RECEIVER SHOULD BE CHANGED IF IT FAILS TO RESPOND TO EITHER AUDIO OR BFO DURING ANY ONE OF THESE CHECKS.		
B. FREQUENCY 200 TO 400 KC: IS AUDIO AND BFO PRESENT?			
C. FREQUENCY 400 TO 900 KC: IS AUDIO AND BFO PRESENT?			
D. FREQUENCY 900 TO 1800 KC: IS AUDIO AND BFO PRESENT?			
E. CHECK BFO BY SELECTING A STATION AND TUNING TO MAXIMUM ON TUNING METER. THROW BFO SWITCH TO ON POSITION. IS BEAT NOTE PRESENT?			

Shirburn Castle, Oxfordshire, built in 1378 by Sir Warren De Lisle, has been the home of the Earls of Macclesfield since the reign of George I. The brick walls, disguised by a thick coating of gray rough-cast, rise straight from the waters of an artificial lake.

THE AIRMAN'S WORLD

He has missed much of lore and romance
and learning who has not wheeled in a little
airplane above the good earth
at the altitude and pace of the seagull.

The face of the land has a multiform character
fashioned in various ways by those who dwell
or have dwelt there. The winding of the highway
and the turnings of the streams
and the marching of the hedges
and the contours of crumbling foundations
all tell him who looks down with seeing eyes
what manner of man lived here.

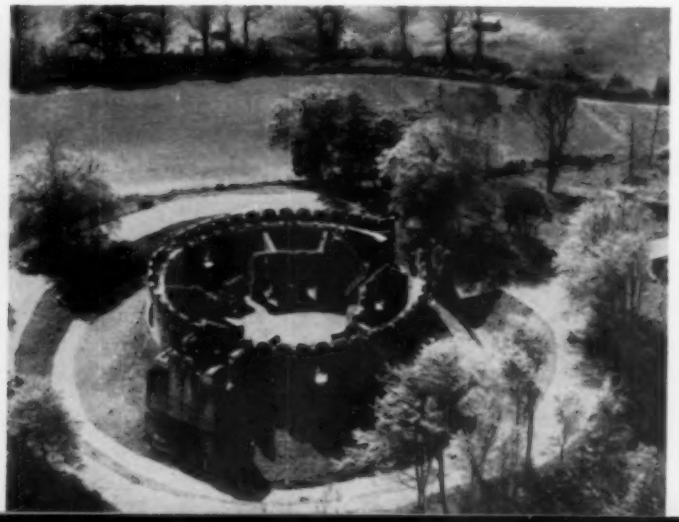
Did he love the land and hold precious its possession?
Did he put down roots in the tilling of the soil
and the bounding of the acres?
Did he plant and build and mend and give dignity
or did he rape and pass on?
Whatever he did is still there for the man
in the little airplane to see.
If there were castles in his mind,
there will be remnants of castles in the land.
If he looked up, there will be spires that pointed up.

From the Cheviot Hills on the Scottish border
to the White Cliffs of Dover and over to Penzance
by Land's End is a journey for a little airplane.
Weaving hither and yon, never far from salt water
at any point, lies England,
a tapestry of time in a fretted frame of sea.
Within the perimeter of my lazy wings
I may capture the centuries of men who lived below—
the altars of the Iron Age and before,
the traces of the fiercely proud Celts and Angles
and Jutes and Saxons, the bastions of the Romans
the castles of the Normans. I may ponder
on the stout hearts of Alfred the Great
and the fabled King Arthur and Canute and Egbert,
who loved the land long before William defeated Harold
on the Field of the Cloth of Gold.
How could I learn more,
understand better, seek so much so happily, else?
My wings are a thousand books.

GILL ROBB WILSON

Scotney Castle, Kent (1837), was planned to resemble a Tudor house with moat; a Richard II tower; Elizabethan and Jacobean ruins.

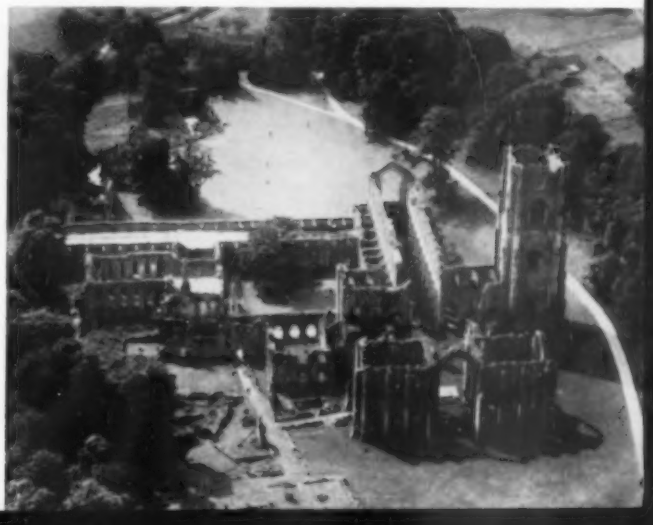
Restormel Castle, Cornwall, atop a hill, is Norman, probably built by Robert of Mortain (circa 1100 A.D.). It saw its last siege in 1643.



Leeds Castle, Maidstone, Kent, has many Plantagenet and Tudor features; a royal possession from the time of Edward VI, who gave it to Queen Eleanor, and after her death, to Margaret, his second wife. It belonged, in turn, to the queens of Edward II, Henry IV and Henry VI.

Former site of Maiden Castle, Dorset; fortress of the pre-Roman Iron Age; 45 acres enclosed atop a hill with 60-foot ramparts.

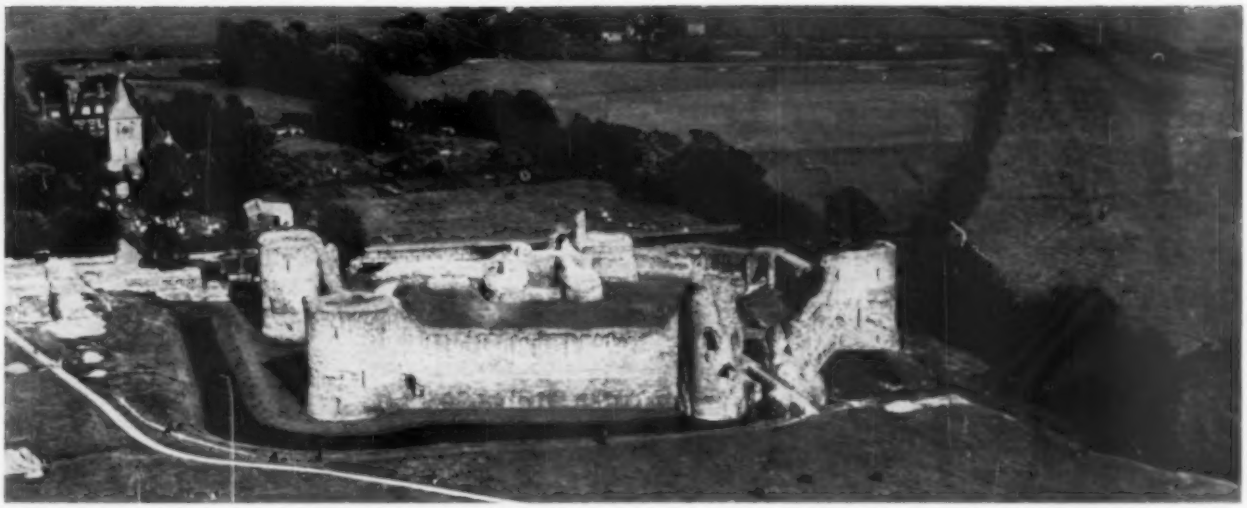
Fountains Abbey, Yorkshire, largest monastic ruin in England built in 12th and 13th centuries. The 170-foot tower was added in 16th century.



Deal Castle, Kent, built in 1539 by Henry VIII. Our sightseeing pilot will find the castle standing at the southern boundary of the town. The walls taper from 30 feet at the base to 11 feet at the top. The moat is now dry but the structure is well preserved and always in residence.

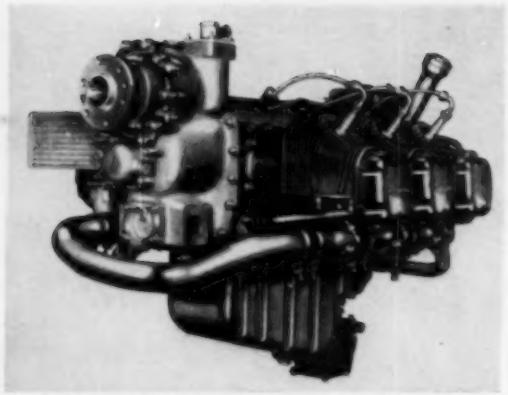
Castle Rising, Norfolk; a Norman fortress built on ancient Roman or pre-Roman foundations. A fine example of Norman architecture.

Maxstoke Castle, Warwickshire, built by William De Clinton around 1354, was rebuilt in 1589 by Sir Thomas Dilke and is still in the family.

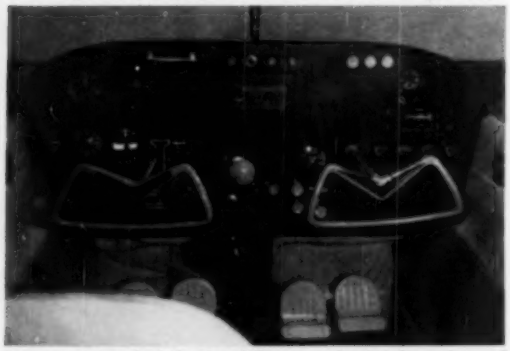


Pevensey, originally built by the Romans, was rebuilt by the Normans after the conquest. Walls approximately 20 feet thick rise to a height of 30 feet and enclose nine acres. Pevensey's history is embattled. Among those who besieged it were Simon de Montfort and John of Gaunt.

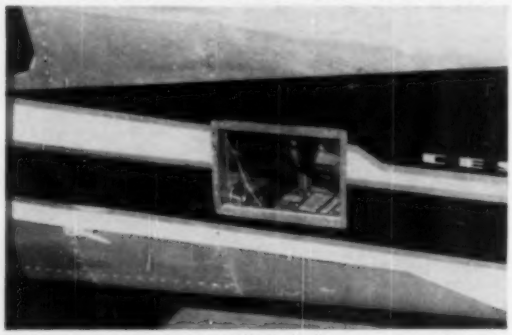
Our pilot scarce needs to be briefed that he is looking down on an ancient Roman amphitheatre; and the map tells him he is cruising along the river Ver opposite St. Albans. This is the site of an important Roman town, Verulamium and gladiatorial contests here rivaled Rome itself.



The Continental GO-300A, 175-hp, geared engine powers the Cessna 175. Note gear case which throws the centerline of prop somewhat higher than the centerline of the crankshaft which allows use of an 84-inch prop while still maintaining a 12-inch ground clearance. Oil radiator is at left of gear case.



Instrument panel of the 175 differs considerably from those of other Cessna models. All flight instruments are grouped in front of the pilot. Radio has been moved to center panel.



Battery compartment is just aft of the baggage compartment. The outside door access for easy servicing is shown here.

Convenient cowl access door for checking and adding oil.

Designed to fill the gap between the 172 and 182 models, Cessna has produced an airplane with many new features, the most significant of which is a new Continental engine.

By NORMAN JACOBSHAGEN

FLYING CHECK PILOT **REPORT ON THE**

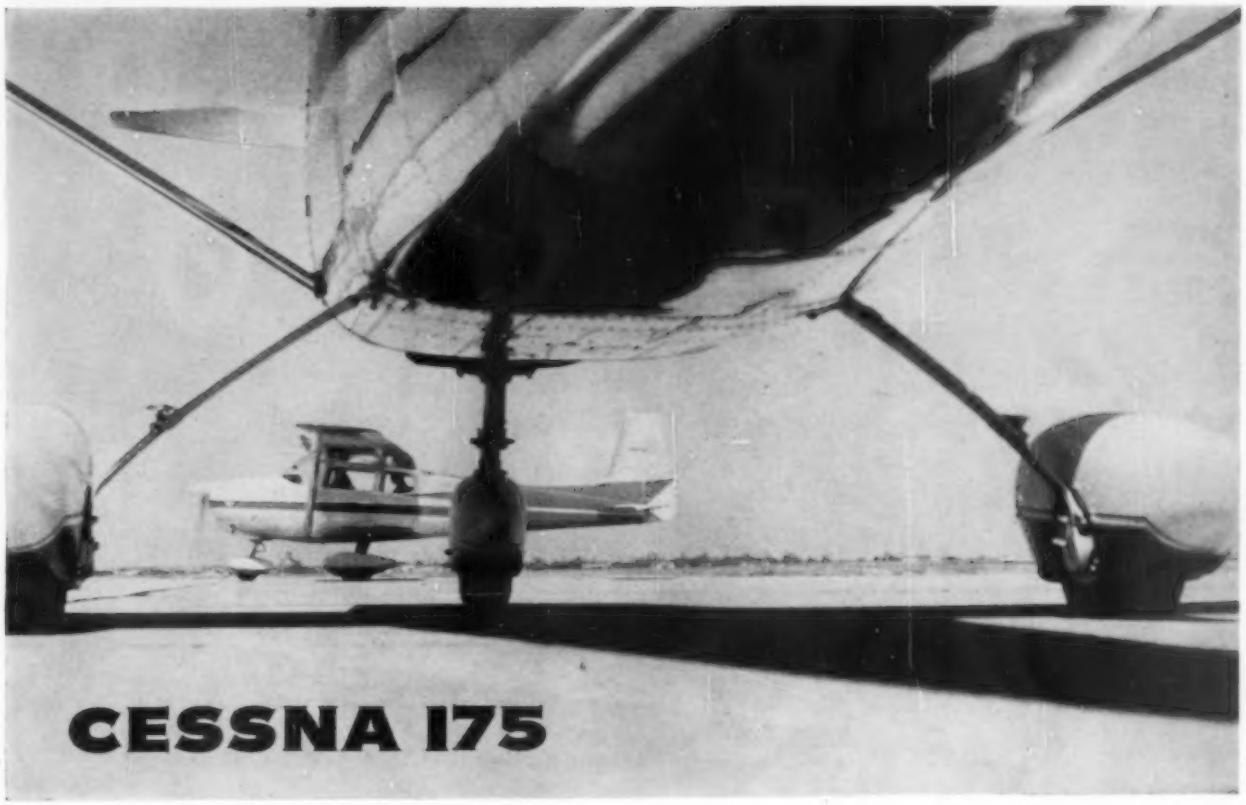
CESSNA'S NEW 175 will undoubtedly cause conjecture as to whether it is a souped-up 172 or a "demuscled" 182. But outward appearance is far from the criterion. Actually the 175 is an answer to a market requirement—a constructive answer. The 175 becomes Cessna's second airplane in the low-price field and is designed to fill the user gap between the model 172 and 182. After all you don't take a completely new and more powerful engine and slap it into an available airframe. It takes many thousands of engineering hours to revise a structure properly for increased performance; make the myriad changes this entails; work out the necessary compromises between strength and weight, ad infinitum.

The item of greatest difference and most interest in this new 175 craft is the six-cylinder, Continental GO-300A, 175-hp, geared engine. This is undoubtedly one of the points upon which the engineers spent considerable time—deciding whether they could gain more performance with a smaller propeller mounted directly on the shaft or with a .75 to 1 gear ratio which allowed them to swing an 84-inch propeller and still maintain a ground clearance of 12 inches; and add a bit to quiet operation. In advocacy of their decision, the engineers advanced the efficiency of the large propeller which is especially notable in take-off and climb performance.

The engine puts out its 175 hp at 3,200 rpm, using 80 octane fuel and is approved for continuous running at this speed. For normal cruising, the company recommends the following:

From sea level to 5,000 feet.....2,400—2,900 rpm
From 5,000 to 10,000 feet.....2,400—3,050 rpm
From 10,000 feet up.....2,500—3,200 rpm

These settings provide exceptional flexibility in cruise



CESSNA 175

control. The 175 operates all the way from 12 gallons per hour, giving a range of 475 miles, to 6.2 gallons per hour, affording a range of 730 miles. One can take his pick of airspeeds from 99 to 140 mph. Such a choice should satisfy everyone from the man who wants to get the last mile out of his fuel to the one who "simply can't waste a second" in getting from here to yonder.

One of the distinctive identification features of this model is the gear housing mounted at the front of the crankcase. It raises the centerline of the propeller eight to ten inches above the centerline of the engine shaft. This gives an unusual amount of room in the upper part of the engine compartment. In fact, there is enough room to reach in and test plug connections if one so desires during ground check. A small access door on the left side of the cowl allows you to check the oil level as well as to add oil.

At this point, if your eyes are alert for construction details, you'll note, just ahead of the firewall, an aluminum channel which follows the cross sectional shape of the fuselage. This ring is fastened to the four engine mounting points, connecting to rubber shock mounts. The rubber mounts in turn are fastened directly to the engine mounts. The rear of the cowl is fastened to the ring instead of the firewall, as in the other models. This is the "floating cowl suspension" which was devised by Cessna engineers to bleed out noise and vibration which would be transmitted to the cabin.

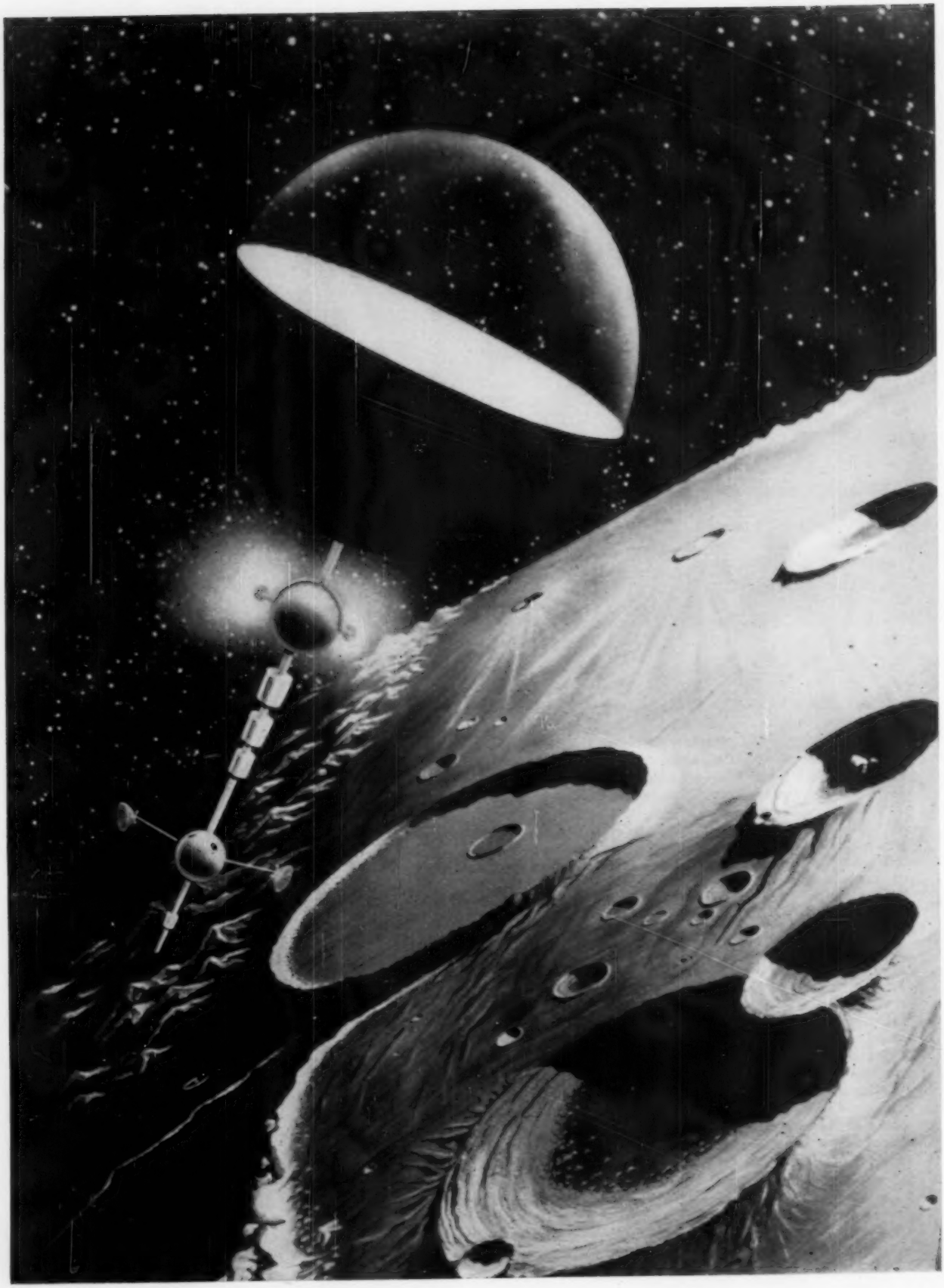
Another item of special interest in the engine installation is the oil cooler, standard equipment, mounted directly on the engine. It is placed in the air intake opening. This radiator is mainly responsible for the fact that the engine can be operated at full rated horsepower indefinitely. It should obviate any possible heating troubles from long climbs and other high power operations—especially in extreme summer temperatures.

As to exterior appearance of the 175, there's no questioning that this is a member of the Cessna family. The same paint styling as found on the other models has been applied. Prospective buyers have a choice of colors including Ranger Red, Rio Orange, Nairobi Black and Highland Green with Alpine White used as a common color for striping. The design of the painting is striking. A look at an unpainted 175 shows the difference. The stripe gives a long sweeping look to the airplane—a high finned appearance in keeping with today's automobiles—or perhaps it's vice-versa.

The interior of the 175, too, resembles its stable mates. Choice of colors is Dixie Gray or Palm Green. Gray interiors are highlighted with black bolsters, red trim and black carpeting. Green interiors have ivory bolsters, black trim and carpeting. The effect in either case is handsome and should be a selling point with wives who have kept their husbands grounded because they remember the drab interiors of a few years back.

The significant change on the inside of the 175, at least to pilots, is the instrument panel. It is considerably different, but not enough to confuse anyone familiar with other Cessna models. For the most part, the panel seems to be very logically planned. Instruments are grouped according to use and placed for easy reading. All flight instruments are directly in front of the pilot. The lower section of the panel has room for three additional instruments, and the section is tilted out and up for easier scanning.

The radio is located high in the center of the panel, making it readily available to (*Continued on page* 60)



PART II

The first half of this two-part article on spacecraft and satellites appeared in our June issue.

THRESHOLD OF SPACE

Let's not underestimate Man's potential on the road into space. Exciting developments in space vehicles are promised by advanced space technology.

By T. S. DONALDSON

THE SATELLOIDS: By 1962, another type of vehicle will become available to the space pioneers. It will be a direct descendant of the X-15 family, with several significant new departures.

It will call on enough starting thrust to equal the top "cruising" speed of the big intercontinental ballistic missiles, but will not return to the atmosphere in a fiery plunge after a mere 5,000 miles. Instead, this new vehicle would call on a small "sustainer" motor to prolong its flight to one or more orbits around the globe. The interesting thing about the cruise of these satelloid aircraft will be that their fuel consumption in their pseudo-orbit will be quite low; once a moving body is outside the earth's atmosphere, traveling within a few thousand miles per hour of orbiting speeds, it does not require much of a push to prolong its flight by tens of thousands of miles.

If orbiting velocity has been reached, the satelloid's tiny cruising rocket will serve another purpose. It will permit multiple orbits around the globe at altitudes lower than possible to an unpowered satellite. The powered satellites will be able to race around the earth at a distance of only 50 miles from the surface, or about ten times the ceiling of present-day jet bombers. This altitude will permit "close-in," one hesitates to use the term low-level, reconnaissance to supplement observations from "pure" satellites orbiting from 200 miles to thousands of miles above the earth.

At 50 miles' altitude, enough air molecules are encountered often enough to create a braking effect on an orbiting body; within hours, within a few orbits, enough speed would have been dissipated to bring about violent re-entry in an unpowered, uncontrolled satellite. Periodic pulses of power from the satelloid's midget engine, on the other hand, would offset the faint drag of the molecules of atmosphere, and keep canceling out the pull of gravity. Fuel consumption for this operation would be out of this world; figures from 100 miles per gallon of fuel/oxidizer can be expected.

Opposite page: The solar-powered space ship here depicted in a flight around the moon was conceived by Krafft A. Ehricke of the Convair Division, General Dynamics Corporation.

The manned satelloid has several other advantages over the high-flying, unpowered satellite. One is a matter of size—and cost. Since this type of vehicle would have a flight duration measured in hours (at the most, days) it would not need to carry its own air regenerating system. The pilot could breathe bottled oxygen, and would not need the other cumbersome elements of a self-contained world to keep him alive, unlike the crew of a true satellite.

On his way back to earth, such a pilot need not rely on a "dead-stick" dip into the denser air. If he realizes that he is approaching a critical point in airframe heating, he can prolong his re-entry by hours through the use of the small sustaining engine. Only winged or finned spacecraft or satellites can use these lifting surfaces in skipping out of the atmosphere for a cooling-off period. In addition a satelloid craft needs no braking rockets to slow it below orbiting speeds. It is already cruising at conditions (speed, altitude, or both) leading to a gradual return to earth.

Unmanned Satellites: This particular era is already upon us. Between the Explorer and Vanguard and Sputniks of today, and the more sophisticated hardware in tomorrow's skies, there is only a difference in degree.

Pilotless reconnaissance vehicles will be among the first to whisk around the earth. At least one such satellite has reached the development stage in this country, and Russia may well beat us to the draw. First christened with the picturesque designation of "Big Brother," the project was later renamed "Pied Piper"; and little is known beyond the fact that Lockheed Aircraft Company has landed the development contract for the system.

This does not mean that one cannot form a fairly accurate picture of the satellites in this group. Test versions may well be up and around before the year is out.

It has already been proposed, for instance, to replace the Thor IRBM's warhead or test instrument loads with two additional stages of high-energy, solid-fuel rockets. The third stage, with an empty weight of almost 1,000 pounds, could carry enough instruments to broadcast visual information back to earth for a limited time.

Chances are that the operational reconnaissance satellite will have to bide its time until something in the Titan-Class ICBM is available. Because the Titan is a true two-stage missile (unlike the Atlas ICBM, which drops off only its booster engines, "skirts" and related components —which has earned it the designation of "1½-stage"), it requires only one additional high-energy stage to become a very powerful launching device for large unmanned satellites. The Martin Titan will be able to hurl loads of several tons into orbit—quite adequate for unmanned observation platforms of a fairly long operational life.

How would these unmanned observers operate? These appear to be the most likely techniques:

(a) Optical observation: Equipped with television cameras and transmitters, this type of satellite could broadcast a continuous stream of information on the earth surfaces beneath it. Fine detail would be lacking, but it should be possible to detect vast troop concentrations, shipping movements and air fleet assemblies.

(b) Radar Observation: These could be the logical extensions of our radar stations on the DEW line, our radar picket ships and planes. Such satellites would send information into ground-based scopes, enabling observers to spot ships, planes or missiles in motion.

(c) Infrared Reconnaissance: This type of satellite would focus on all the hot spots of the globe, and emit information which could be reproduced in a meaningful visual pattern. All cities, vehicle concentrations, aircraft, ships or missiles in powered flights would appear well defined in an infrared projection.

It is probable that advance versions of all three types will be equipped with specially-timed devices to record and emit at intervals. All of the above electronic systems depend on line-of-sight broadcasts for effective operation, and it becomes rapidly obvious that a low-altitude observation satellite cruising over Tomsk, Siberia, would only serve the purposes of an observer peeking into a screen located at Tobolsk. Therefore, it will be necessary to store acquired information, probably on electronic tape, and to broadcast at calculated intervals while the orbiting Spy-Eye raced over a different part of the globe.

Alternatively, orbits could be selected at such distances from the surface of the earth that large portions of the globe would move into the line-of-sight area. For instance, at 22,000 miles' distance, about one-quarter of the globe would become accessible in this fashion to a single satellite.

This type of man-made moon would coast around the world just once every 24 hours. In different guises, it could serve alternatively as a rebroadcasting unit for a world-wide television hook-up, a weather observer with a global perspective, or the granddaddy of all electronic countermeasure vehicles. Cast in the latter role, three or four of these celestial noisemakers could jam anything from missile guidance radars to your favorite adult Western show.

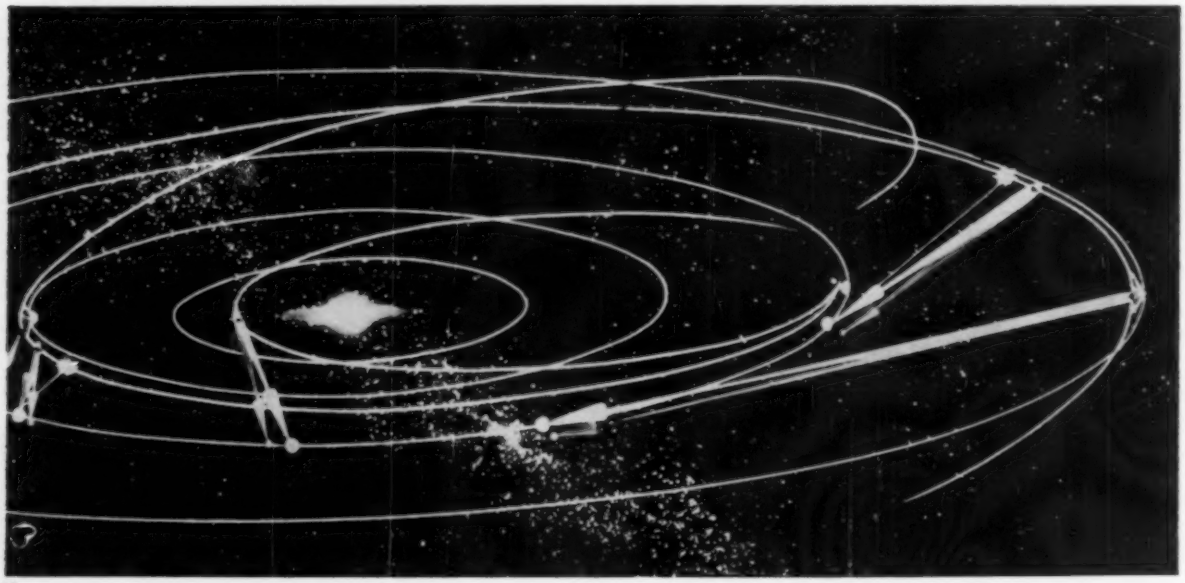
In actual practice, semi-permanent weather stations would be positioned at somewhat lower altitudes. Some 4,000 miles up seems to offer the best possible compromise between maximum earth surface and good meteorological details on cloud structure, wind patterns and other weather features. Equipped with solar batteries, small fission steam/electricity generators, or solar furnaces, 20-odd weather satellites of this type will enable meteorologists to predict short and long-term weather patterns with the greatest accuracy.

Astronomers, too, will want to hitch their wagon to one or more of these skybound observation platforms. They will probably require the clear resolution and the opportunity for enlargements which film alone offers. For anything from the proving or disproving of the Martian *canali* to four-dimensional studies in cosmology, astronomers require the unblurred, unblinking view from outer space.

This calls, of course, for recoverable satellites, and that's a tall order. It will be remembered that such vehicles must be slowed by rocket reaction until their velocity drops below orbiting speeds; they must then be guided into the dense atmosphere at an angle shallow enough to prevent destructive heating; and the maneuver must be so timed and directed that they come to final rest at a point on the earth where recovery is possible.

We have already discussed (*Continued on page* 69)

Artist's concept of instrumented probes for electronic data-gathering calculated to intercept the orbits of Mercury, Venus and Mars.



AIRPORT CO-OPERATIVE

GRAIN VALLEY—Grain Valley Airport (1) Public Use; 5 mi W; El 830; Lat 39-01, Long 94-13; Kansas City Cht. Paved runways: N 1600, SW 2400. Services: Tie-downs, Major repairs, Gas: 80-91 Oct. NOTE: Attended 24 hrs.

Instead of just owning airplanes, this group of businessmen-pilots owns an airport

By MATTHEW J. BRUCCOLI

ANY FORMULA for rescuing any element of grass-roots aviation from its myriad problems deserves careful study. One of the most interesting and heartwarming solutions to the problem of developing and running a small airport is the co-operative venture at Grain Valley, Mo., some 13 miles southeast of Kansas City.

Only a couple of years ago, a sad group of displaced pilots faced the all too familiar tragedy of being forced to abandon their base of flight activity to a spreading land industrialization. When their old airport closed down, the first disgusted urge was to sell their airplanes and take up golf.

But this did not seem the appropriate solution to those for whom flying has more than a superficial interest. With the spunk and enterprise which are still American trademarks, a group of these airplane owners, rather than be satisfied with vocal lamentations, decided to employ a device sometimes considered extreme, often eccentric—action!

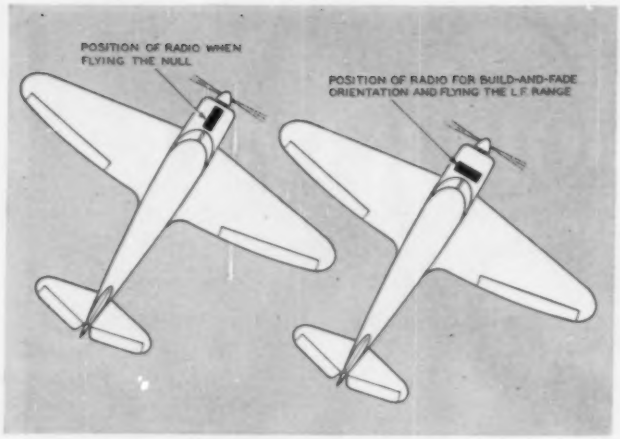
Officers of Grain Valley Airport, Corp., l. to r.: Lucian DeTar, pres.; Walter S. Jennings, sec'y-treas.; R. S. Stafford, Rufus Wilson, Jack W. Barnhart, board of directors; and Wilbur N. Baker, airport operator. All own and pilot planes.

Under the leadership of Frank V. Mawby and Walter S. Jennings, a meeting was called to which 11 plane owners responded. The result was the forming of an organization which closely resembles a well-run flying club—but instead of owning airplanes, this group owns an airport.

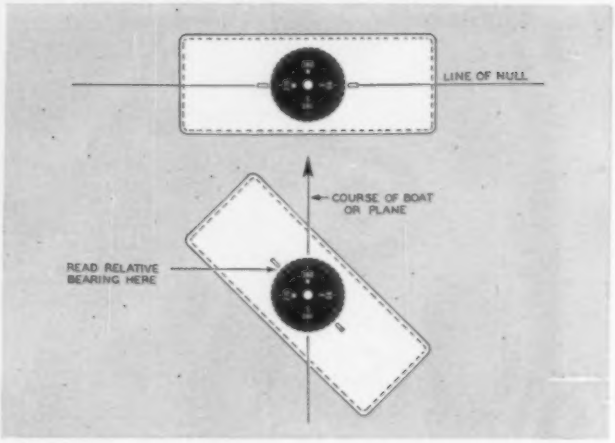
Of course, it didn't just happen—there was a lot of spade work to be done: incorporating the group, drawing up the sound and workable rules under which they operate, finding the acreage, securing title, laying out the runways, lining up local financing, bulldozing, building the hangars and other facilities and, last but far from least—convincing the local city fathers that the airport would be an asset to the community.

Today the Grain Valley Airport is owned and run by a co-operative association, properly incorporated, of some 35 members. Built on 75 acres from which no housing or industrial development may drive them, the new airport gives its owners a sense of permanency and security which has encouraged them to provide such almost Utopian advantages and facilities as:

- Three hard-surface, all-weather runways, the longest 2,600 feet and lighted all night, every night.
- The lighted runway has tri-color approach beams at each end showing the pilot amber, if he is too high; red, if too low; and green for a correct approach.
- Thirty neat and sturdy metal T-hangars with concrete flooring and concrete parking ramp, roller sliding doors, and floodlighted at night.
- Living quarters for an A & E so that service is available day and night.
- A roomy building embracing office, lounge and a shop with capacity to overhaul three ships comfortably. The lounge accommodates more than 100 persons who may look from a large picture-window upon a spanking, efficient operation, the envy of many a municipal or (*Continued on page 75*)



By manually manipulating the Navigator, a good useable null can be picked up on either broadcast or airway bands.



Right: Top view of the Navigator showing rotatable azimuth scale which gives a quick relative bearing of station from plane.

By WAYNE THOMIS
Aviation Editor, Chicago Tribune

The author, in a Piper Apache, tunes the Royal Zenith "760" which he has found to be a dependable, standby, navigational instrument.

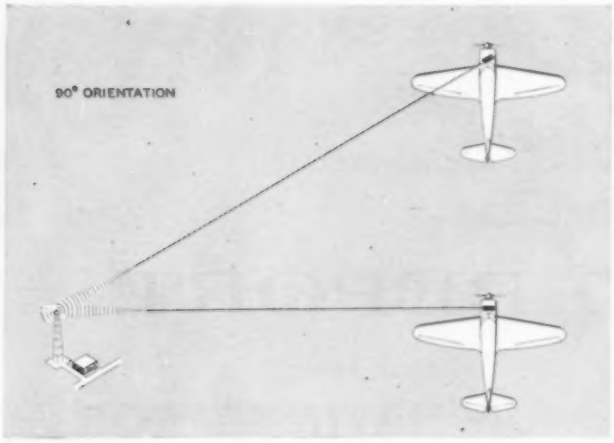
FLYING CHECK PILOT

CHECK PILOT REPORT ON THE

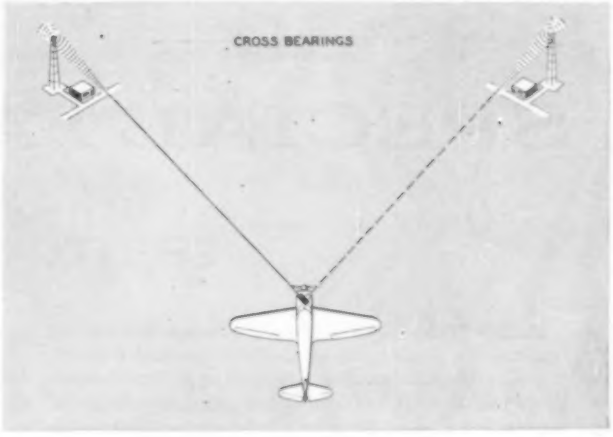
MANY PILOTS have been hoping ever since the electronics industry began using transistors that those magical little gimmicks would be applied to aircraft communications and navigation equipment. They are coming but haven't reached the average executive, private, charter or week-end pilot. The industry says transistors adequate for the job in the very high or ultra high frequency bands still are in the laboratory stage.

But two big television and radio manufacturers are making transistor type receivers which have a good deal of utility for airmen. These are small, portable, battery-powered units which receive signals on the standard broadcast (550-1500 kc) and on the long wave, low frequency (150-400 kc) bands. In addition to supplying news, entertainment and sports results, they can give airmen the civil aviation weather broadcasts around the clock—every 30 minutes from many stations still on this long wave band. Both are conveniently dimensioned, lightweight, relatively inexpensive and provide exceptional long life on penny-priced flashlight batteries. These assets are conferred, of course, by transistor circuits.

One of them is very much more than just a convenient weather receiver. This one has exceptional sensitivity and sufficient volume for use without phones in a lightplane. Furthermore, as the writer and a succession of other pilots have discovered, it has solid capabilities as a standby, independent, navigational instrument that will make it a *must* for everyone who flies. That goes for big planes and small, singles and multiples, pistons or jets. I refer to the new Zenith 760 Navigator. This three-and-a-quarter pound,



The Navigator can be used to get a null 90-degree wingtip identification of station position for to-from determination.



Right: Quick "area fixes" are easy. Rough relative bearing readings can be obtained on both broadcast and range stations.

This compact little portable serves instrument-rated pilot and fair-weather flier equally well.

ZENITH NAVIGATOR 760

eight-transistor (no tubes) package is a bombshell. Its ability to guide must be demonstrated to be believed. In effect—for the airman—it has all the capacity of the standard manual type radio compass which led the way for the commercial airlines in the 1930's. With a little practice, truly astounding accuracies can be obtained.

The Navigator has two flat, vertically polarized, ferrite-bar, wire-wound, built-in antennas. One for the broadcast band; one for the airway band. Either supplies a good useable null (absence of signal) for its respective wave spectrum. This null is what the best modern automatic direction-finding radio compasses use. By manually manipulating the little Navigator, a pilot in a lightplane can get the same directional information. Readings were made on stations over 200 miles away. While the nulls at such distances were wide, they narrowed as approaches were made and careful following and constant reduction of volume provided guidance that took us repeatedly right across stations.

A "normal or navigation" switch cuts off automatic volume control within the Navigator's circuits for such guidance uses. With AVC out practically anyone can follow range legs; cones of silence are hit with no less accuracy than with an exterior antenna, and quite precise instrument let-downs are possible. In fact, with these specific navigating capacities, the Navigator has been used in the following:

- Null 90-degree wingtip identification of station position for to-from determination.
- Rough relative bearing readings on both broadcast and range stations. These are rough only by comparison with ADF equipment 20 times more expensive. Quick "area fixes" are easy with the navigator's definitive information—and that's what a lost lightplane pilot wants anyway.
- Enough null movement so that problems of distance-to-station and time-to-station can be worked out. These are always indicative only, not absolute under any circumstances. With the Navigator, useful estimates are obtained.
- Null riding to a station—disregarding range legs for the long wave bands. This works equally well on broadcast stations.
- Standard range orientation of the true-fade, 90-degree combinations. Sensitive volume control and clear sharp signal reception makes leg riding a pleasure. And, mind you again, on the self-contained antenna.
- Sharp "cones." In the course of a dozen or more simulated let-downs on different ranges with varying powers, the writer got cones that were the equal of any low frequency radio unit he has ever flown. If you are a little to one side of the station and get "a piece of the cone" only, the single signal fades out absolutely, while the side A or N comes through crisply. Also you get the sharp "key clicks" when you begin to get in close with the Navigator—and, of course, the build and slide of the volume as you cross the station.

None of us noticed any tendency of the Navigator to change its A to an N when you are in close and riding a very narrow leg and bank the air- (*Continued on page* 66)

SPECIAL FAI REPORT

WINGS FOR

A SLENDER MAN IN A chaplain's frock sat quietly at the speaker's table of the 51st General Conference of the Federation Aeronautique Internationale. It was ironic that, of all the delegates attending the FAI convention in Los Angeles' Ambassador Hotel, this soldier-clergyman, Col. Dean Hess, USAF, most typified the full significance of the worldwide assembly.

It was Colonel Hess, a famed combat pilot of two wars, who conceived the theme for the FAI conference—"recognition of individual and organizational contributions to the Humanities of Aviation."

To Colonel Hess this was a milestone achieved out of blood and sorrow. It meant that in this year 1958 his dream of airpower for peace was becoming substantial. "The seed has been planted," he told me. "The true heritage of the air age is to foster peace, not war. In this day when we're pointing the noses of our vehicles toward outer space, I'm convinced that our goal is beyond the Moon and Mars—God."

When FAI ceremonies were completed, Colonel Hess stood up modestly, moved to the microphone and said: "Bless Thou the children of this world, that they may never again be subject to the cruelties of human hands in anger. We, in single accord, pledge ourselves to be dedicated in heart and mind to the humanities to which this assembly aspires."

There was an odd silence thereafter. It was as if each of the FAI delegates from 44 nations, including the Soviet Union, wanted to savor the impact of those words. Here was a man who had crouched behind the stuttering guns of a P-47 over Europe in World War II, a dedicated airman who had organized the ROK Air Force in Korea, pleading for peace. An amazed look crossed the faces of the four Russian delegates. Imagine a Red Air Force pilot speaking that way! But this was America, and the Pentagon, unlike the Kremlin, had already blessed Colonel Hess' views.

Colonel Hess had deliberately withheld proposing eventual establishment of a USAF Department of Humanities until the FAI meeting. "Such a thing can be considered only in a worldwide concept," he told me. "It should not be for the benefit of America alone. The ultimate responsibility of aviation is to the world as a whole, to every man, woman and child everywhere."

Acknowledgment of Colonel Hess' devotion came to the FAI meeting in a message from USAF Chief of Staff, Gen. Thomas White. General White sympathetically gave recognition to the idea by announcing establishment of a monitorship created to further the use of airpower "as a constructive instrument for peace."

Intrigued by the thought-provoking development, I took time from covering the Conference for FLYING Magazine to discuss it with Colonel Hess and learn first-hand the dramatic story of its origin. This is what Colonel Hess told me: Ever since learning to fly in 1939 at Marietta, Ohio, he has felt a strong link between the wings of the airman's world and the spiritual symbolism of the sky. Came Pearl Harbor, and Hess saw his mission clearly. He joined the Air Corps and eventually headed for the European Theater as a fighter pilot with the Ninth Air Force. After 63 missions and war's end, Hess left the service to take his Masters Degree in history and education.

Miss Jacqueline Cochran, who succeeds Gen. Dr. Charles Sillevaerts as president of FAI, with Gold Medal winner, Lt. Col. David Simons.

Came Korea, and war once again interrupted his work toward a Ph. D. Back in the Air Force, he was set the task of welding green ROK pilots into a Korean Air Force. Leading his student pilots over Communist territory, Hess won fame as the "one man air force." After 250 missions, he again found an objective near to his heart in hundreds of abandoned orphans left helpless in the path of the Communist onslaught. What happened next is a familiar story, told in Hess' splendid book, Battle Hymn, and dramatized in the Universal-International movie of that name. His little band of 1,051 orphans were victims of air power. Hess meant to help them with air power. He demanded an airlift of C-54's to evacuate the orphans to the island of Cheju. "Here were wings of war serving as wings of salvation," he said. "It was a heart warming thing. I saw in it a future concept of airpower."

If nothing else came from the FAI conference, the

By DON DWIGGINS

The Federation Aeronautique Internationale, at its fifty-first general conference, endorsed the use of airpower as a constructive instrument for peace.

WAR OR THE HUMANITIES?

Col. Dean Hess (left), clergyman-combat pilot, poses with Thomas G. Lanphier, Jr., who is president of National Aeronautic Association.

introduction of Hess' spiritual note at the world wide level would mark the conference as a milestone.

Playing its role as representative of the world's aero clubs, FAI awarded numerous medals and citations for individual achievement in conquest of the sky. Winner of the FAI Gold Medal was USAF Maj. David G. Simons for his achievement of August 19-20, 1957, in ascending to 101,486 feet in a USAF-Winzen Research balloon of 3,000,000 cubic feet volume. Special citations were presented to two helicopter pilots, Capt. William H. Knowlton and Lt. Robert H. Busch, of the 56th Air Rescue Squadron at Sidi Slimane, French Morocco, for rescuing 50 persons from a storm-lashed French freighter, the Pei-Ho, off Casablanca last December 12.

Jacqueline Cochran was chosen to succeed Gen. Dr. Charles Sillevaerts of Belgium as new FAI president. Miss Cochran's tireless work was responsible for bringing the 51st General Conference to America on a MATS airlift, a project that exemplified the spirit of the Humanities in using war wings to gather together a virtual United Nations of Aeronautics.

The final business session was devoted to the election of new officers. Fifteen nations were represented in selecting Miss Cochran's officer confreres. First V. P., Jacques Allez, France. Additional V. P.'s: Dr. J. Gaisbacher, Austria; Gen. Charles Sillevaerts, Belgium; Capt. J. Foltmann, Denmark; Carl Francke, Germany; Capt. K. J. G. Bartlett, Great Britain; Gen. Napoleone Del Duca, Italy; Robles Ochoa, Mexico; M. C. Kolff, Netherlands; D. Federico Norena Echevarria, Spain; Maj. Gen. Nils Soderberg, Sweden; Dr. W. Muri, Switzerland; Capt. J. J. Ide, United States; S. Staritchevsky, U.S.S.R., and Slobodan Sakota, Yugoslavia. Under guidance of this representative group of aviation experts the FAI will enter consideration of the Space Age. In fact, FAI's Director-General Harold R. Gillman of France told the delegates: "What some of the altitude and speed records will be in the future is difficult to say, but I can inform you that the FAI is already considering the problem of records with manned rockets and similar high speed vehicles."

Historically, FAI was born in Paris, October 14, 1905, when the first statutes and bylaws were signed by aero club representatives from eight nations—Belgium, France, Germany, Great Britain, Italy, Spain, Switzerland and the United States. Today, says the FAI, "with our membership at more than five times the original, that early faith in aviation, winged or wingless, lighter-than-air or model, has life and death importance to every creature on earth . . ."

Russia, which bid successfully for the honor of hosting next year's FAI General Conference at Moscow, reported 565 different competitions in 1957 for aeromodeling, parachuting, gliding and powered flying. More than 23,500 persons participated. Russia's youth become airminded early. Her aero clubs number 320,000 participants.

FAI's 51st General Conference concluded with the universal feeling that aviation today faces the greatest challenge in its history—an opportunity to unite the world in better understanding.

The challenge is best summed up in Gen. Thomas White's message to the FAI members, read by Miss Cochran: "The uses of airpower as a constructive instrument for peace have often been overlooked. This is probably because of the fact that the influences of airpower are not easily identified. However, it is not theory but fact, verified through experience, that airpower—composed of people and machines—can also be of value when used for constructive purposes. So it is in this theme that the United States Air Force, working for years with other Federal agencies, has furthered our efforts in the betterment of human relations with peoples of other nations. To assure maximum benefits from the USAF contributions to this element of constructive strategy, I have directed that a close monitorship of USAF efforts in this field be exercised by the community relations division of Headquarters, USAF."

That theme may stand as tomorrow's Magna Charta of airpower. END

Above: Lt. Col. "Pete" Everest set a new record by pushing the X-2 to 1,900 mph, 26 July 1956. Iven Kincheloe later broke it.

Above: Capt. J. W. "Joe" Kittinger, USAF balloonist, rose to a then record height of 96,000 feet in a sealed gondola on 2 June, 1957.

Above: Test pilot Scott Crossfield in a centrifuge machine which duplicates the stress of extreme acceleration encountered by jet pilots flying at extremely high altitudes. In the centrifuge, Crossfield withstood the heaviest loads of pressure he is likely to meet when he makes the first flight in the X-15.

THE MAN'S

FROM THE DRAMA OF ORIGINAL creation to the latest significant event in modern history, the central theme is man. Man and man alone gives meaning to all—ties all together. Nor will the attainment of the space age differ, regardless of where it leads or what it discloses.

We can not be disinterested in empty satellites because they are the probing fingers of men but their story is relatively inarticulate so long as they reflect nothing of human reaction. The free world was sharply aroused from its lethargy by the orbiting of several Soviet satellites—and properly so. Nevertheless, let it be marked that at this writing every known record of human penetration toward the frontiers of space is held by a free man!

Mark well the faces on these pages. Do they look like

Above: Strapped in a steel sled at Holloman AFB, N. M., in December '54, Col. John Stapp was rocketed down a track at 632 mph and stopped in 1.4 seconds, subjecting him to 40 G's. During the 1.4 seconds his normal weight of 168½ pounds shot up to 6,740 pounds! Black eyes resulted from his eyeballs bouncing in his head. Shock of stopping was equivalent to an auto hitting a stone wall at 50 mph.

Maj. Charles "Chuck" Yeager, first USAF test pilot to fly faster than the speed of sound, made record-breaking flight of 1,650 mph or Mach 2½ in supersonic aircraft, the Bell X-1A.

On 7 September '56, Capt. Iven Kincheloe flew to an altitude never before reached by man—over 23 miles (126,000 feet).

Above: Maj. David G. Simons, USAF, Chief of Space Biology Branch of Aero-Medical Field Laboratory, Holloman Air Development Center, N. M., soared to 102,000 feet in a balloon and proved that man could survive above the atmosphere sea surrounding the earth.

THE THING

men content to stand and throw marbles at Mars?

They or their confreres will be aboard when the chemically-propelled WS-110 flashes through the ionosphere at plus Mach 3. They or other free men will be at the controls when the 11-year-old nuclear engine project finally takes the air. One such will be riding the X-15 when she porpoises along the shore of outer space at Mach 7. Another will call back his findings from the Douglas D-558.

Such as these are the good hands in which rests the case of freedom. And such as they will continue to set and hold the records in penetration of space, if behind them the theme of the dignity of man does not bog down in o'erweaning politics, in contentment with mediocrity, in lethargy of vision.

G. R. W.

Above: North American's test pilot, George Franklin Smith is the first pilot to have survived a supersonic bailout. He was forced to eject at 6,500 feet while barreling down at 777 mph.

Above: Maj. Arthur Murray, USAF, flew the Bell X-1A to 90,000 feet on 26 August 1954, extending a record of 83,235 feet set by Lt. Col. Marion Carl, USMC, on 21 August 1953 in a Douglas D-558-II.

Above: On 27 September, 1956, Capt. Milburn G. Apt, USAF, reached a reported 2,178 mph in the X-2. Dropping from a B-50 mother plane at 30,000, Apt ignited his engine which gulped over a ton of fuel per minute and soon reported, "The engine has cut and I'm beginning to turn." Six seconds of silence followed by a garbled word, and a few minutes later, his body was found in the cockpit capsule on the desert—the 13th test pilot to give his life at Edwards AFB.

THE PRO'S NEST

A non-technical explanation of GCA and ILS landing aids by a veteran airline pilot.

Ground control radar operators pick up planes at holding beacons on Search Approach screens and feed them at regular intervals to Final Approach Controller (far left).

When the chips are down

By MARIUS LODEESEN
Captain, Pan Am

I AM NOT AUTHORIZED to speak for my confreres but I believe the following opinions represent the feelings of most experienced airline pilots.

What actually do we think of the two landing aids, ILS (Instrument Landing System), and GCA (Ground Controlled Approach)? Why do some pilots prefer the first, others the second? Is there really much difference in accuracy or in the skill required to execute them?

Landing minimums have been gradually reduced throughout the years. With the advent of more powerful and effective approach and runway lighting I believe we will soon be in a position to lower them appreciably more. In Europe, for reasons we will not go into here, pilots are allowed to take a "look-see"—make an approach even if weather conditions at the field are reported below minimums. If, upon reaching minimum altitude, we find conditions equal to or better than official minimum, we are allowed to land. Practice has proved that countless times, although ground observations give prevailing conditions as well below minimum, we find we can land, due to strong lights and local variation in visibility and cloud level.

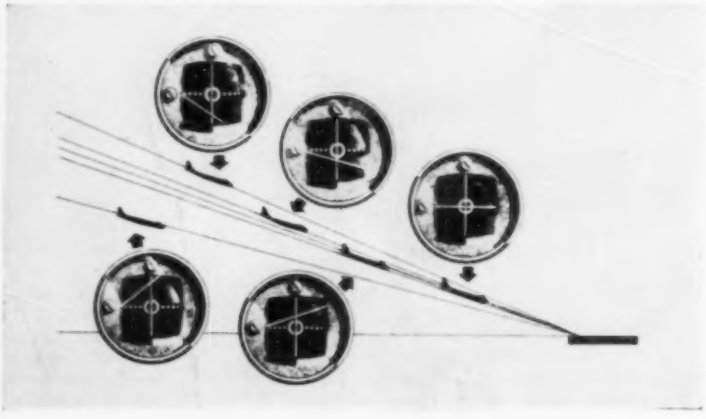
But what will it be, ILS or GCA? Or perhaps a combination of both? Let us briefly evaluate the strong and weak points of each method. If you are familiar with them, please skip the next few paragraphs.

GCA is a system whereby the flight of the aircraft is controlled from the ground by an operator who sees the airplane on his radar scope, similar to a TV screen. Aircraft are guided on final approach to the designated instrument runway. The final approach flight path on the precision scope (PAR) is greatly expanded for increased accuracy and furnishes the controller with range, azimuth and altitude information. This permits the controller to guide the pilot to touchdown on the runway.

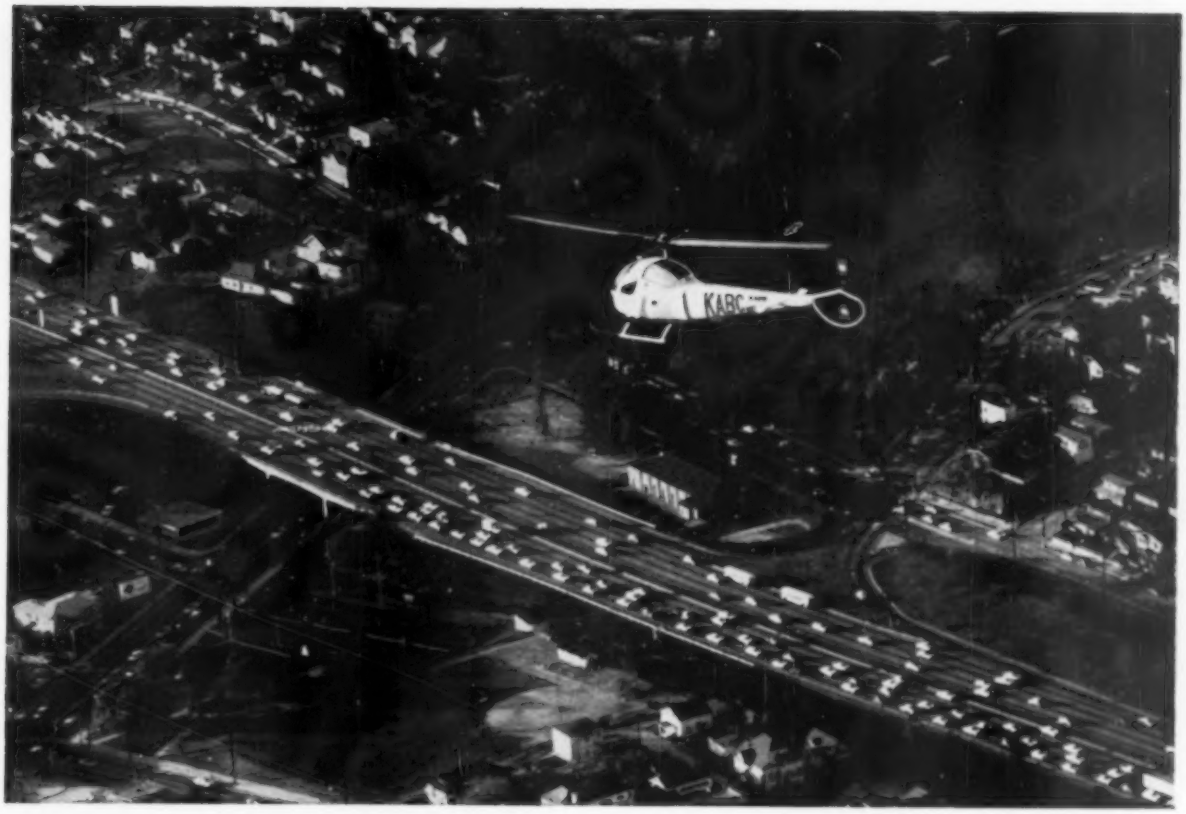
Advantages of this system are primarily the control over the entire area so that planes can be spaced at certain intervals and fed into the final approach pattern. No equipment need be carried on the aircraft other than a radio receiver and transmitter. Even a relatively inexperienced pilot, unfamiliar with the airfield and its approaches, can follow GCA instructions and make a safe landing within reasonable limits.

Principal disadvantages are the cost of human operators, always high as compared to automatic systems. The pilot cannot, except for additional (*Continued on page* 77)

As long as the vertical and horizontal bars of the glide-path indicator are centered, the aircraft flies on the exact approach path to the runway. System is fully automatic.



OPERATION "AIRWATCH" SPARKED BY AC HELPS KEEP FREEWAYS FREE!



Reliable AC Aircraft Spark Plugs used exclusively in "Airwatch" 'Copter

Operation "Airwatch"—KABC's popular radio program in Los Angeles and Southern California—expedites freeway traffic by advising motorists of driving conditions from a hovering helicopter. Ace air-rescue pilot, Max Schumacher, handles the controls of the Bell 47H while veteran newsman, Donn Reed, reports freeway driving conditions in two-hour stints twice daily.

Mechanic Edward Ockwatt reports up to one-third more service life from the AC LA-47 Spark Plugs as compared to other makes. That's why ACs are used exclusively in Operation Airwatch. They heat up fast to burn away fouling combustion deposits as soon as they form . . . stay clean longer! AC Aircraft Spark Plugs deliver the high-incendivity spark so necessary for peak power and efficiency in aircraft engines.

For better performance and lower maintenance, install AC Aircraft Spark Plugs in your plane, today! Ask your nearby AC Supplier.

Watch Walt Disney Studios' ZORRO every week on ABC-TV

flying starts with

AC

AIRCRAFT SPARK PLUGS

AC SPARK PLUG ✿ THE ELECTRONICS DIVISION OF GENERAL MOTORS

DISTRIBUTED BY: Airwork Corporation: Millville, New Jersey; Miami Springs, Florida; Newark, New Jersey; Atlanta, Georgia; Alexandria, Virginia; Cleveland, Ohio. **Pacific Airmotive Corporation:** Burbank, California; Seattle, Washington; Oakland, California; Kansas City, Kansas; Denver, Colorado; Linden, New Jersey. **Southwest Airmotive Company:** Dallas, Texas; Kansas City, Kansas; Denver, Colorado. **Standard Aero Engine Ltd.:** Winnipeg, Manitoba; Vancouver, B.C.; Edmonton, Alberta. **Van Dusen Aircraft Supplies, Inc.:** Chicago, Illinois; Minneapolis, Minnesota; Teterboro, New Jersey; East Boston, Massachusetts; Alexandria, Virginia; Richmond, Virginia; Miami, Florida.

No. 221

It is downright dangerous when an experienced pilot performs his pre-flight checks automatically.

I LEARNED ABOUT FLYING FROM THAT?

By VIRGIL E. LAMARRE

THE GRAVEL FLEW as I spun my car into the airport drive and braked to a stop in front of the office. "Hey, Milt!" I called. "Is it okay if I drive out on the field to load up?"

Milt Berz, airport manager at Birmingham, Mich., where my Cessna 120 is based, wiped his brow deliberately. He takes a dim view of letting cars onto the field, and properly so. I should know, for I once nosed over when my ship hit a deep car rut. Nevertheless I pressed: "Look," I said, "the field's dry; I've got a big load of stuff; and I want to beat the sun up north."

That was no lie. Our cottage lies 165 miles north of Detroit, at Tawas, and remembering a couple of nerve-wracking landings after dusk on the tiny sod runway, I had no stomach for another—especially in a loaded airplane on a hot, windless night and without lights.

I looked forward to these week-end trips. I'd been making them for three summers now. An hour and a half was par for the course. Compare that with four hours on a highway crowded with impatient week-enders, travelling bumper to bumper. Normally I leave the office in plenty of time to reach Tawas before sundown. But this day was an exception. I'd had the bad luck to have a last minute meeting, so arrived at the airport an hour later than usual. To further complicate matters, I'd promised to pick up a friend at James Clemens airport at Bay City, 100 miles along the way, and I prided myself on my clocklike precision. So the pressure was on. As a result I was destined to learn a lesson I'll never forget.

Milt capitulated. In a matter of minutes I had the airplane loaded—my wife's golf clubs, 15 frozen steaks, my two-suiter, a bag of laundry, a bunch of magazines and miscellaneous articles that a family can conjure up.

I have plenty of stout ropes for emergency tie-downs and lashing week-end baggage. I used them to advantage now, in case I hit heavy weather. A golf bag is always a problem. My passenger, I reflected, could hold it on his lap after my stop at Bay City.

I had owned this airplane for five years. I figured I knew it thoroughly. Moreover, I'd been flying more than 20 years and was not averse to describing myself as "a cautious pilot." My pre-flight procedure is routine. After hundreds of such checks on the same airplane a fellow ought to be pretty good at it; or so I thought.

Tied down, or in a hangar, I keep my wheels chocked. I use three-quarter inch ropes and insist upon tying them myself. I'm careful about the tension too. And I always keep the control wheels lashed to prevent possible wind damage to the ailerons and tail surfaces.

My procedure this day didn't vary—much. I went through all the familiar motions—loosened the controls and worked the wheel—gave the exterior a visual once-over—inspected the control hinges and rocked the ship a bit. This latter maneuver never fails to kindle additional confidence in the sturdiness of my craft. Despite my haste, all these things I did. Ropes untied, I checked the master and magneto switches to make sure they were off, then gave the primer a couple of shots and turned the prop manually a few times.

Climbing aboard with some difficulty, due to the impedimenta, I fastened my safety belt, flipped the switches, cracked the throttle and pulled the starter button. As usual, the engine responded immediately.

It was insufferably hot. Even with the windows open cabin temperature was around 100 degrees. Quickly scanning the engine instruments and adjusting my altimeter, I glanced at the fuel gauges overhead, applied carburetor heat and pulled away toward the taxi strip. A student in a trainer had slipped in ahead and was now leisurely running up his engine. I pulled up (*Continued on page* 80)

Join with many other young men who want their active part in this air age . . . and who want to enjoy both study and play in Miami's perfect year-'round climate.

A LIFETIME CAREER IN AVIATION and a pleasant day of boating have much in common. To do either, you've got to know where you're going, chart your course and get "off to a great start."

But an outboard motor is nothing compared to the complicated maintenance and repair of modern multi-engine aircraft . . . or the developments in jet and rocket propulsion. It takes *specialized* training to work on powerplants, wings, fuselages, landing gears, control systems, propellers, carburetors, fuel systems, and rigging. That's where Embry-Riddle enters the picture.

A graduate of the E-R *Airframe and Powerplant Technician* course has acquired all the knowledge and specialized skills necessary to completely disassemble, repair, and re-assemble an airplane. He has become a professional technician.

In addition, Embry-Riddle offers many other courses tailored to your specific aviation interest. Whatever your course, you will receive individualized education under personal supervision of a faculty of specialists.

FOUNDED 1926

Embry Riddle

AERONAUTICAL INSTITUTE

MAIL THIS COUPON TODAY

for pictorial brochure and full information.

DIRECTOR OF ADMISSIONS,
Embry-Riddle Aeronautical Institute
111 Aviation Building
Miami 52, Florida

I want to be in the lead of the air frontier. Send me background material on world-famous E-R training.

Print Name _____

Address _____

City _____ State _____

Age _____ ☐ Vet ☐ Non-Vet

- ☐ AIRFRAME & POWERPLANT TECHNICIAN
- ☐ AERONAUTICAL ENGINEERING TECHNOLOGY
- ☐ BUSINESS PILOT
- ☐ COMMERCIAL PILOT
- ☐ A & P COMBINED WITH COMMERCIAL PILOT
- ☐ INSTRUMENT RATING

He Found Success in the Air

At California's Ontario International Airport, 35 miles from downtown Los Angeles, Shell dealer Les Farrar runs one of the fastest growing aviation service companies in America

As Les will tell you, to run a successful aviation service you must have top-flight products and equipment.

In his own words, "I was looking for an Oil Company that guaranteed quality products—quality service—down-the-line dependability. And I wanted the best dealer-supplier relationship available. I found Shell's approach similar to mine—a 24-hour readiness to go beyond the letter of a contract to be helpful."

So Les Farrar teamed up with Shell 5 years ago.

Today Ontario International Airport provides rapid, efficient fueling service for commercial, military, business and private aircraft . . . in fact just about anything that flies. Growth has been rapid . . . gallonage has increased *twenty* times in the five years Les has been with Shell.

How does he do it? Les picks up valuable merchandising tips from the Shell dealer magazine. And through the Shell Aviation Specialist, Les keeps posted on new ways to build the kind of service fliers want.

A key part of his service program is the Shell Credit Card System . . . a time-saver designed to help fliers meet exacting schedules.

Business is good at Ontario. In fact it is so good that Les is looking forward to expanding his facilities. Plans include a new 2,000-foot runway extension to accommodate the ever-increasing traffic.

The fine reputation of the Les Farrar Aviation Service is widespread and still growing. As for the future? Les himself will tell you that with Shell helping him in every venture—the sky's the limit!

Round-the-clock tower and modern all-weather equipment serve the airlines, a Forestry Service fire-fighting unit, an Air National Guard unit and turn-around customers.

Studying airport expansion plans (left to right) are Art Clark, vice-president of Les Farrar Aviation Services; Thomas E. Flaherty, Airport Manager; Fred Stewart, Shell Aviation Representative; and Les Farrar.

Giant military transports come to Ontario for modification by Southern California Aircraft Corporation and Lockheed Aircraft Service Corporation. They rely on Les Farrar for fine service and Shell for high-quality fuels and lubricants.

It pays to be a Shell Aviation Dealer

—and your nearest Shell Office will be glad to tell you why

SHELL

The Soviet Pilot

(Continued from page 25)

It avoids the all-too-common business of the square peg in the round hole, both from the standpoint of the individual and the service itself.

In the case of the air force, DOSAAF gives the future pilot his elementary flight training. It takes the future navigator through the basic training period; it gives the mechanic an opportunity to tear down engines and put them together again. In DOSAAF the future air force radio operator learns how to send and receive messages, and how to make simple repairs on basic equipment. Most every city in Russia has at least one airfield for lightplanes and gliders. Money to maintain the field, to put up an unpainted wooden hangar and to buy airplanes and gliders comes from annual contributions to DOSAAF.

Alexander Yakovlev, the famous Russian designer, has long turned his attention to DOSAAF and the Red Air Force's need for training aircraft. Currently the beginning pilot in Russia learns to fly the Yak-18, a single engine monoplane resembling in many respects the PT-19 developed in this country during World War II. It is powered by an M-11RF1 five-cylinder, radial, air-cooled engine developing 160 hp. This engine has long been a part of the Soviet powerplant spectrum. The Yak-18 comes with and without tricycle gear, fully retractable. Flight training is conducted in an irregular manner, conforming only to the student's time away from his regular work. How well he does depends more on his interest and abilities than on any static program that has been worked out for him. Some future pilots first learn to fly a glider, and gradually work into powered aircraft. The wisdom of this method has been argued pro and con in Russia in recent years, with the glider advocates apparently in the lead at the moment.

Those who are the best pilots get the best opportunities when time comes for them to enter service. There are many training bases in Russia for the intermediate course, when the DOSAAF member graduates to air cadet and goes to the nearest large city to live in barracks on the airfield. Here he learns to fly the Yak-11, a tandem seat, low-wing monoplane with a 730 hp, ASh-21, seven-cylinder, radial engine. The plane has a standard landing gear, retractable. Its top speed is just under 300 mph, range is 700 miles. It can get as high as 25,000 feet.

In addition to two or three hundred hours of flight training, the pilot gets intensive Link-trainer experience, meteorology, navigation, communications, maintenance and a heavy dose of political indoctrination. When he comes out of the intermediate training program, he has qualified as an instrument pilot as well as in gunnery, bombing and other standard tactics. How well he did as a pilot, and his natural inclinations, will determine where he now goes. It may be to jet fighters or bombers; he may end up as a pilot instructor, a pilot with Aeroflot, or if he has been washed out, he may go to navigator's school, or take training as a bombardier, or even as a mechanic, though few of the latter ever wear more than sergeant's stripes.

While the pilot has been taking his intermediate training, others who belonged to his age-group in DOSAAF but who lacked interest or aptitude for becoming pilots, have been to other schools to learn to become skilled mechanics, or to fill other air force requirements. The emphasis is on making everyone into a pilot, and the striving to achieve that goal is therefore very great, but in the end only the best are given the opportunity. Those who don't "get their wings," so to speak, usually are not unhappy with their lot. Just being in the air force in Russia is an achievement in itself and sets a man apart, assuring him of a better than average living and social position.

DOSAAF constantly engages in contests to find the best glider pilot, the best aircraft pilot, the best mechanic, navigator, radio operator. Each year there are local contests, whose winners compete in Republic contests (USSR has 16 Republics or states), and finally in a national contest. The big event of the year is Soviet Aviation Day, held in June on the first Sunday following the longest day of the year. This is an event carried out under the sponsorship of the flying clubs, which are part of DOSAAF. At Moscow, sponsorship is by the famous Chkalov Central Aero Club, which has a large building at Tushino Airport, where the annual aviation day fly-by takes place. Similar air displays are put on at hundreds of Soviet cities at the same time. Each year the Aviation Day ceremonies open with flights of sports planes flown by DOSAAF members, and usually there is some very fancy glider flying woven into the display. Then come the military pilots flying jets and doing aerobatics, followed by bombers, helicopters and finally transports and paratroopers, using bright, colored chutes, who are dropped on the field from very low altitude.

After he has completed his training in the Yak-11, the air force pilot is commissioned. Those selected for training in jets then move to a field where they fly the U-MiG-15 or the U-Yak-17, both with tandem seating arrangements and meant to do for Russian pilots what the T-33 does for U. S. Air Force pilots by way of teaching operations and tactics. Even now the pilot continues to operate off sod fields. During spring and fall when the rains come, flying may be curtailed for days on end because of the soft ground. During such periods Link-trainer work is increased and classroom work extended. Flight training continues to be coupled with intensive ground training and exacting study of navigation, weather, tactics and the History of the Communist Party. Even when he moves into active air force units, the training exercises continue relentlessly. Bringing teamwork to the men of the Soviet air forces, especially the pilots, is no easy task for the commanders. Russians are inclined to operate equipment in either of two ways: one way is that of the robot and the other is in a highly personal manner, suggestive of the individual daring and courage of a Cossack.

Bomber-interceptor missions are run off continuously in the USSR. Even far inland one finds two or four MiG-15s or MiG-17s sitting on the end of runways, with the pilots lolling under the wings in summer, ready for take-off at a moment's notice in the event of enemy air attack.

By the age of 20, the Soviet air force pilot already is one of the best paid men in all Russia. An air force captain, receiving flight pay, gets 3,000 rubles per month, plus free housing and other incidentals, such as free food, clothing, and three ounces of vodka a day for himself. He receives coupons so that he may buy clothing for his family at half price, or take them to public eating places at half the cost paid by other customers. Presumably, he also gets a substantial discount on air travel, to judge by the number of air force officers found on Aeroflot's aircraft. Such special privileges extend into the army or navy for the same rank. In Russia the airman is a special sort of fellow and therefore must be given special rewards.

Great expansion of the Soviet air forces since World War II has assured officers of rapid advancement. As they mature, the more promising are sent to advanced military schools, of which there are many. Future top commanders of the air forces go to the Voroshilov Higher Military Academy in Moscow, the general staff college for all Soviet armed services. Combat commanders likely go to the Frunze Military Academy, also in Moscow. There are similar academies for navigators, engineers and others in the air forces.

For the young man who wants to get away from the log house and a front yard of potato vines, the Soviet air forces offer one of the most promising avenues of escape. Along with science, engineering, and teaching, life in the air forces has been made an outlet for the skills, talents, intelligence and ambitions of its young people by the Soviet State. For this reason, the men of the Soviet air forces represent the country's best. END

NEXT MONTH
IN
FLYING

DID YOU KNOW that a man actually took a mural-sized *aerial* photograph of devastated San Francisco just after the earthquake of 1906, from an altitude of 1,500 feet using a camera weighing almost three-fourths of a ton?

George "Flashlight" Lawrence was the photographer and contact prints of his fabulous photograph were 8 feet long and 4½ feet high. See the August issue for a reproduction of the picture and a fascinating description of how he did it.

challenging future

HAS THE ANSWER

HAS THE ANSWER

HAS THE ANSWER

HAS THE ANSWER

SPARTAN TRAINING HAS THE ANSWER

rewarding occupation

HAS THE ANSWER

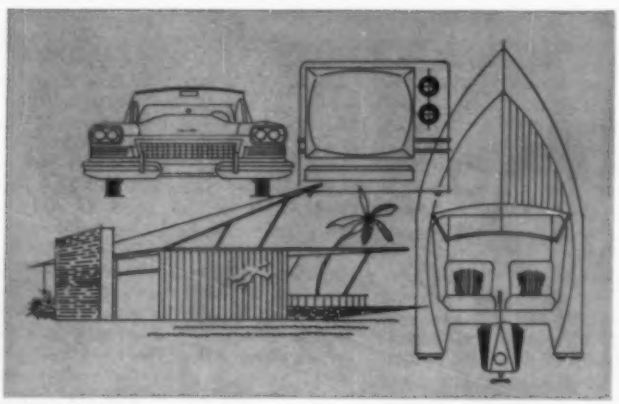
HAS THE ANSWER

Spartan training combines college level classroom science with laboratory and shop experience to quickly prepare you for a whole new future — an important position in aviation and a higher standard of living! Courses include aircraft mechanics (including jet engines) and instrument mechanics which can lead to an exciting career in aviation electronics. Tuition payable monthly — just pay as you go and no more!

Fill out and mail coupon today for new brochure, "AVIATION OPPORTUNITIES" — there's no obligation!

SPARTAN

School of Aeronautics • Municipal Airport • Tulsa, Oklahoma



J. O. Payne, Director of Training
Spartan School of Aeronautics Dept. F-78
Municipal Airport, Tulsa, Oklahoma
Please send complete information immediately.

Name_____ Age_____

Address_____

City_____ State_____

Indicate which of these branches interests you:

- ☐ Jet Engine Mechanic
- ☐ Aircraft and Engine Mechanics
- ☐ Instrument Technician (Standard and Electrical)
- ☐ Flight Engineer
- ☐ Commercial Pilot
- ☐ Pilot Instrument Rating
- ☐ Link Trainer Instructor

Spartan is approved for training under G. I. Bill of Rights

DOT AIRTRONICS

THE EAST COAST'S finest aeronautical radio, sales, service and custom installation facilities.

CAA approved repair station. Certificate No. 3992, Radio Class 1 and 2 Unlimited. Limited instruments. Lear L-2 Automatic Flight Control Systems and Lear Arcon Automatic Rudder Control Systems.

Distributors for ARC, Dare, Flighttronics, Lear, Narco, Wright. Service and facilities for all manufacturers including Collins, Bendix, Sun-Air, Wilcox, etc.

DOT AIRTRONICS

Zahns Airport, Lindenhurst, N.Y.

Write for Zahns Airport Guide

FLY-IN FISHING LODGE NO. 1

EAST TROUT LAKE

Saskatchewan, Canada

THIS SPORTSMAN'S "paradise" is a wilderness lodge reached only by air. Run by Hank and Jane Hoffman (mailing address, Manolosa, Sask.) it offers both fishing and moose hunting.

Popular with both U.S. and Canadian Flying Farmers, the Lodge has its own 2,200-ft. E-W air strip with two-way radio. Another is maintained at Manolosa, about 15 miles NW on Highway No. 2, for air pickup of mail, supplies and non-flying guests. Emergency gas is available at E. Trout Lake, but service must be obtained at Prince Albert. Housekeeping log cabins, with boat, rent for $20 and $30 a day for four and six persons; special rates for groups.

Pioneer of Pioneers

(Continued from page 27)

of wood. The spectators rushed to him, convinced that he had been killed, but the young aeronaut struggled out of the wreckage, with no injuries worse than a few bruises.

Lilienthal learned from experience. Following this crash he designed a telescopic rod device which projected below his gliders to absorb the shock of his falls. By 1893 he was able to take off and soar distances of 500 yards, landing without incident each time. In the three years that followed, his gliders grew until they embraced 150 square feet of surface and had fixed tailplanes. By 1896 he had designed his *super* glider, a biplane, whereas his previous aircraft had all been monoplanes. This biplane had approximately 200 square feet of surface, with a horizontal rudder and a vertical stabilizer. In this glider Lilienthal reckoned to travel 1,000 or more yards and to soar to greater heights.

When Otto came to test the large biplane, however, he found that swinging his body and legs did not give him sufficient control. Now he built a second biplane with horizontal tailplane which could be moved up and down. The question was: how to manipulate the tailplane since both hands were occupied in grasping the crossbar which supported him beneath the wings. A novel idea occurred to him. He devised a tightly fitting cap from which he stretched a taut cord to the rear rudder of his glider. Then, by nodding his head up or down while gliding, he could operate the movable rear-plane and achieve surer control.

Lilienthal's diary reveals that he made no less than 2,000 test flights in his gliders. With the biplane he not only rose several hundred feet above the ground, but held himself aloft as long as ten minutes on thermal currents. On invisible eddies which other fliers were to study in later years but which he recognized long before the era of the powered airplane, he balanced himself by barely perceptible movements of arms, legs, and head. He wrote a book describing in detail his experiences and experiments. The book, *Bird Flight as the Basis of Aviation*, came into the hands of Wilbur and Orville Wright in the United States, and first fired them with the idea which led eventually to the powered flying machine.

One evening Gustav arrived in Berlin to find Otto deeply engrossed in a new set of blueprints. "What are you planning?" he asked, puzzled by mathematical

(Continued on page 58)

OO-LA-LA IN BUSINESS FLYING:

SAC-Modernized Beech Modern as Sack

HAUT COUTURE UPS PERFORMANCE FOR MODEL 18

You'd scarcely know the girl after her transformation down in Dallas, Texas — the Paris, France, of aeronautical high fashion. We refer, of course, to the Model 18 Beech.

Ribbons held by Model 23 (Years) Shirley Wright tie into:

Wasp Junior engine, overhauled or exchanged.

Cockpit, with controls, instruments, radio, and interior overhauled or converted to the owner's individual needs and tastes.

Propeller, overhauled and improved.

Wheel well door and exhaust system, modified as a part of the Conrad Kit conversion for higher safety and performance.

Labor prices for more than 25 important Twin Beech services are listed in our new Flat Rate catalog, proving it pays to go modern by going to Southwest Airmotive — America's quality-specialist in Beech airplanes. Write Service Sales Manager for details and immediate scheduling.

Southwest Airmotive Co.

LOVE FIELD, DALLAS

DISTRIBUTION DIVISIONS: KANSAS CITY • DENVER

1932 A QUARTER CENTURY OF LEADERSHIP 1958

Cessna 170 and 172 owners . . .

increase your cruising speed 5 MPH plus!

SIMPLY by changing to a new Sensenich Model M74DR metal propeller you can increase the cruising speed of your Cessna 170 or 172 at least 5 miles per hour *without* sacrificing rate of climb! The thoroughly tested and C.A.A. approved Model M74DR weighs 3 pounds *less* yet has a higher endurance factor, the result of a new Sensenich-designed airfoil section. A shorter diameter provides greater ground clearance and lower tip speeds that reduce noise and increase service life.

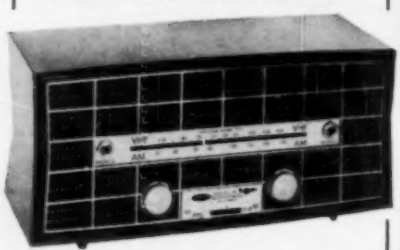
Get maximum performance, efficiency and economy of operation—replace with a Sensenich Model M74DR Metal Propeller. It can be used with your present spinner. If you own a Cessna 170 or 172 you owe it to yourself to get all the facts on this new propeller for your plane. Write, wire or phone for details.

SENSENICH CORPORATION • Dept. Y, Lancaster, Pennsylvania

Sensenich Propellers

Sensenich PROP SHOP . . . Certified Repair Station for all makes fixed pitch metal or wood propellers . . . Sensenich, Beech and Hartzell controllables. Magnaflux, etching, anodizing and plating service available. Service Hangar on Lancaster Municipal Airport. Approved Propeller Repair Station 3528. Unlimited Class 1 and 2 ratings. Phone: Lancaster LOwell 9-0435

NOW! A BRAND NEW AIR-O-EAR HOME VHF Plus AM RECEIVER



Hear planes in flight, control towers, weather, emergency and standard broadcasts. Plugs into any wall socket. 200 mile reception with built-in antenna. Sold throughout the world direct from manufacturer.

AIR-O-EAR MODEL 711 $79.95

Same as above with added LF (200-400 KC) Model 711-WN.....$99.95

AIR-O-EAR IS USED BY . . . AMERICAN AIRLINES, NORTHEAST AIRLINES, TRANSOCEAN AIRLINES, STANDARD OIL COMPANY, BELL AIRCRAFT, ALAMO AIRWAYS, CHAMPION SPARK PLUG CO., NORTHERN CONSOLIDATED AIRLINES, U. S. PLYWOOD CORP., FLYING TIGER AIRLINES.

Now Order from this Convenient Coupon

NOVA-TECH, INC. JULY FLYING
1721 Sepulveda Blvd., Manhattan Beach, Calif.

Gentlemen: Please ship your new AIR-O-EAR VHF Receiver with 10-day return privilege. I enclose $.....for Model..... ☐ C.O.D.

NAME.....

ADDRESS.....

CITY.....STATE.....

50' x 14'
Mosher Canopy-Bifold Electrical Door at Moore Flying Service Merrill Field Anchorage, Alaska

Insulated door for heated storage hangar. Opens in one full complete panel.

For details write:

MOSHER MANUFACTURING COMPANY
421 Johnson St. N.E.
Minneapolis 13, Minn.
Phone: FEderal 9-4776

(Continued from page 56)

calculations he did not understand.

Otto looked up, his face lined by the long hours devoted to his new effort. "I believe," he said, "that we can fit an engine to a glider and fly. I am planning to build a glider and install a motor to maintain it aloft regardless of the wind; and to make a sustained flight between two given points over, say 50 to 100 kilometres."

Nothing in Otto Lilienthal's plans fundamentally altered the structure of his biplane-gliders; all he planned to do was to fit a cylinder of compressed carbonic acid gas into the wingframe of his biplane. Released by a hand-controlled valve, the gas would, by way of tubes, give a beating action to miniature wings at the extremities of the glider's main surfaces.

"I will take off from the hill in my ordinary gliding flight," Otto explained, "but as soon as I am high enough above the hill I will turn on the gas to operate the small wings which will propel the craft forward while maintaining height, and so allow me to travel in motored flight until the gas in the cylinder is exhausted."

On the day before he was due to make his powered flight, Lilienthal decided to make a final routine test glide in his biplane in preparation for the great adventure on the morrow. Gustav was to accompany him to the hill but was called away on other business at the last moment, so Otto went off with three members of his staff who would witness the test. A gusty wind was blowing and conditions were dangerous, but shortly the wind dropped to a whisper and became ideal for testing. Lilienthal moved his glider to the starting position and began to run as he had done a thousand times before. Behind him he heard someone shout but was too far away by then to hear the warning that he had forgotten to adjust his landing shock absorber. As he became airborne, a rising current swept him steeply up and away from the hill. Otto was controlling his glider masterfully and from the ground appeared to be enjoying his flight but extreme turbulence was evident. However, he was descending easily until about 50 feet from the ground when a violent gust caught him and stood his craft on its tail. Swiftly Lilienthal righted his plane but it now was in a stall. For a second it hung there, then plummeted to earth.

His assistants raced to the spot and found Lilienthal unconscious in the wreckage. His body had taken the full force of the crash, owing to the absence of the home-made shock absorber which on previous occasions had saved his life under identical circumstances. He did not regain consciousness and died the next day. His one fatal moment of forgetfulness had robbed him not only of his life but possibly of the chance to have become the first human being to make a *powered* flight.

But Lilienthal did not soar in vain; by his early efforts, he laid the foundation for modern aviation. In his hometown of Anklam one may muse upon a monument which shows him standing with eager outstretched wings. END

3 planes flown by company executives fully insured with INA's extra value

The gentleman stepping into this company plane is Richard O. Wilson, President of the Wilco Machine Works, Inc., of Memphis. He flies the plane himself, as do the other top executives at Wilco.

The company owns three planes: two late model Cessnas and a Piper Apache. All three are fully covered by hull and liability insurance tailored by Insurance Company of North America, the nation's leading independent underwriter of aviation insurance.

INA can provide you with aviation insurance to fit your needs; and extra service, with 20,000 agents and claim service in 102 offices.

These Extra Values can be yours, right now. Ask your nearby INA agent for details.

INSURANCE BY NORTH AMERICA

INA 1792

INSURANCE COMPANY OF NORTH AMERICA

On Course the Kane Way

KANE MARK VI DEAD RECKONING COMPUTER

NEW...

All metal computer with metal slide. For wind triangle solution and time, distance, fuel consumption computation. Airspeed—altitude computation accomplished directly using Fahrenheit or Centigrade. In leather case. $15.00 list

with direction manual $3.00 list

Introductory Offer both $8.85

D-4 COMPUTER

For time, distance, ground speed, air speed and altitude computations.

New $1.00

KANE AVIGATION PLOTTER

Acclaimed the greatest advancement in plotter design. Precision engineered—simple to operate—crystal clear. Dimensions: 16 x 3 x 1/16 inches. For Sectional and WAC charts. Outer scale in statute miles, center scale nautical. With leather case and directions..... $3.00

CAA EXAM

PASS CAA EASY

AIDS based on the very latest CAA requirements

PRIVATE PILOT EXAM

New X-country type with charts, Flight Information Manual, Airman's Guide and Teletype data $3.50

COMMERCIAL PILOT EXAM

New X-country with charts..... $3.50

NEW ENGINE MECHANIC EXAM

With Oral and Practical, both..... $3.50

KANE E-6B MANUAL..... list $3.00

reduced..... 1.50

ATTRACTIVE DEALER DISCOUNTS

Money back guarantee on all items

KANE AERO EQUIP'T

MANUFACTURERS AND PUBLISHERS

1845 FORD PARKWAY

ST. PAUL 16, MINNESOTA

Cessna 175

(Continued from page 37)

both pilot and front seat passenger. This position is a vast improvement over former installations in which one almost had to get his head between his knees in order to tune a station. Here it is easy to flick the eyes forward to check for other traffic or guard the flight instruments.

At the top of the panel, just over the radio, is the master switch, generator warning light, landing light switch and navigation light switch. To the right is the parking brake knob, cabin heater knob and cabin air knob plus two blank knobs for additional switches. The parking knob unhappily is the same old hard-to-grasp, hard-to-operate type found on past models. Why they didn't go to the automobile-type parking brake so satisfactory on the 182 I'll never know. I thought this was one of the greatest pilot conveniences advanced in the field of private aircraft in the last decade. But maybe the engineers didn't.

Under the radio, in the center section of the panel are located the ignition, throttle, carburetor heat control, cigarette lighter, starter handle, mixture control, primer, fuses—and, of all things, the tachometer. I presume the engineers located it here as a function of the surrounding controls. Personally, I feel it is located too far away from the direction of flight. I think it would be located better in the flight group. I'm not so sure the tach isn't as much of a flight instrument as it is an engine instrument.

At the extreme right of the panel are two electric gas gauges, oil pressure and oil heat gauges. This is not the best spot for easiest reading, but in flight I didn't find it objectionable. In this area is space for additional radio installation. As praiseworthy, I would like to note that the engineers saw fit to put a T-handle on the pull starter. It's easy to grasp and easy to operate. What a shame they didn't put the same kind of a "T" on the parking brake. Fuel selection valve, trim wheel and flap handle are on the floor between the front seats, as on other models.

Attempts to set up a check flight on the new airplane turned out to be a major undertaking. In Wichita, we had six consecutive week ends of snow, freezing rain and low ceilings. On the occasional good days, I was tied up or no aircraft was available. Finally, late one Thursday afternoon, I climbed into the airplane and fired up. This is just as simple a procedure as in the 172—a couple of shots of primer, turn on the ignition and pull the starter handle. The sound and feel of the engine is considerably different however, because of the propeller gearing. This is not something you say is better or worse. It's just different. Along with the difference in sound, you get a feeling that the prop isn't turning quite fast enough but all this falls into place in a short time and you're no longer aware of the difference. Ground visibility and handling is like other Cessna models —excellent.

The first take-off was made in a normal manner—advance throttle, pick up speed, lift the nosewheel slightly and let the airplane fly off. Acceleration is noticeably better than the 172 but not so sudden as in the higher powered 182.

The first chore was to run some speed checks against the stop watch. The tem-

(Continued on page 62)

DISNEYLAND COMMUTER

WHEN Walt Disney is pressed for time, he flies out to his fabulous Disneyland the only way millions of kids the world over would expect him to go—by 'copter.

He's shown here by a Hiller 12-B used for commuting before Los Angeles Airways started its regular seven round-trip daily commercial 'copter flights to Disneyland, making the trip in 20 minutes compared to 60 by auto freeway.

SUCCESS STORY–1958

Summer, 1958 Young engineer gets vacation with pay.

June, 1958 Moved into his new home.

May, 1958 Promoted to Asst. Chief, Stress Analysis Group. Salary increased to $550.00.

July, 1957 Accepted one of seven jobs offered. Started at $475.00.

June, 1957 Graduated from NORTHROP AERONAUTICAL INSTITUTE ... Had selected job before leaving school.

July, 1955 Enrolled at Northrop Institute in two-year Aeronautical Engineering Technology Course.

April, 1955 First heard about Northrop Institute. Sent for catalog. A really lucky day for him.

In a little over TWO YEARS FROM TODAY—you too can write a similar success story, **if you start to prepare now.**

Northrop
Aeronautical Institute

1175 W. Arbor Vitae Street
Inglewood 1, California

MAIL THE COUPON BELOW FOR COMPLETE INFORMATION

NORTHROP AERONAUTICAL INSTITUTE
1175 W. Arbor Vitae Street, Inglewood 1, California

Please send me immediately the Northrop catalog, employment data, and schedule of class starting dates. I am interested in:

- ☐ Aeronautical Engineering Technology
- ☐ Electronic Engineering Technology
- ☐ Aircraft Maintenance Engineering Technology
- ☐ Master Aircraft and Engine Mechanic
- ☐ Jet Engine Overhaul and Maintenance

Name _____ Age ____

Address _____

City _____ Zone ____ State _____

Veterans: Check here ☐ for Special Veteran Training Information.

12 HOUR CALENDAR CHRONOGRAPH

Our exclusive, "12 hour" calendar chronograph worn by more pilots throughout the world than any other watch.

only $69.95 Fed. Tax included

NOTE THESE WONDERFUL FEATURES:

- 17 jewel movement • Stainless steel case
- Stopwatch • 2 pushers — six hands
- 1/5 second sweep hand with time out feature
- Shows day, date, month
- 30 minute and 12 hour recorder dials
- Anti-magnetic • Unbreakable crystal
- Extra thin • Incablec • Shock resistant

GUARANTEED—Your money back in ten days if not satisfied, for any reason. MAIL ORDERS promptly filled. Shipped postpaid for check or M.O. or will send C.O.D. (20% deposit required on all C.O.D. shipments). Free complete catalog of watches, chronographs and instruments with every order.

WHITE PLAINS WATCH CO., INC.
15 WEST 47th ST., NEW YORK 36, N. Y.
JUdson 6-1751

Expert repair service available on all multi-purpose watches and instruments.

(Continued from page 60)

perature was 52 degrees and with 74 per cent of power (3,000 rpm) the airspeed indicator varied between 135 and 140 mph. Running in four directions gave us a timed average of 139 mph, six mph faster than specifications call for. This could be accounted for by the fact that we were approximately 350 pounds under gross weight, or perhaps it was just because Cessna has a known reputation for publishing conservative performance figures.

After the speed runs, we climbed a few thousand feet to run stall checks. I used full power and a "best climb" speed of 84 mph. The rate of climb stayed right at 1,000 fpm, which is in accordance with the handbook figure—850 fpm at a gross weight of 2,350 pounds. Best rate of climb gives an uncomfortably nose-high position. One hundred and twenty mph climb puts the nose down where you can enjoy better visibility and still takes you upstairs at the rate of 600-700 fpm.

Stalls were made primarily to get an idea of indicated airspeeds and to get the feel of the airplane before shooting landings, rather than to conduct an exhaustive analysis of stall characteristics. These, I thought we would do on the following week end when there was more time. How optimistic can one get! Naturally, the week end brought the usual downpour and low ceilings, so a final analysis had to be foregone. This I determined, however, the 175 has the same impeccable stall characteristics as the other Cessna models. With flaps up and power off, the stall warning came on at 60 mph and the stall occurred at 50 mph. With the elevators up against the stop which took considerable strength to hold, there was only a slight buffeting and a slight bobbing of the nose. There was full aileron control in the stall as I made various turns from left to right with ailerons only. With flaps down and power off, the warning beep sounded at 50 mph and the stall occurred at 40.

The handbook suggests that in case of a go-around or when taking off with flaps, they be released slowly and gently. However, I discovered that with full flaps, full power and a normal climbing airspeed, you can release the flaps as suddenly as you wish and get only an imperceptible sensation of sink, not indicated at all on the altimeter. Keep in mind that this was done with a *normal climb speed*. Lifting the flaps at minimum speeds could induce a stall. So, for completely safe operation, do as the handbook suggests.

Following stalls, landings and take-offs were made for familiarization. Made normally, they feel much like a 172—very easy and with no problems. The handbook calls for a normal approach speed of 70 to 80 mph with flaps up and 65 to 75 with flaps down. I can guarantee this is good advice. I made one approach with flaps up at just a shade over 60 mph. The airplane felt very solid in the smooth air we had on this day. But, when it came time to flare out, practically no elevator control remained. The nose rose

HIGHEST QUALITY PERFORMANCE • MODESTLY PRICED!

THE WRIGHT 90 CHANNEL "Custom Remote" AIRCRAFT TRANSCEIVER

TODAY'S MOST AMAZING VHF TRANSCEIVER VALUE!

THE WRIGHT Executive "60"

"POWER WITH ECONOMY"

- 60 powerful channels
- Channels "Lock on", no tuning
- Crystal controlled transmitter and receiver
- Built of the finest materials
- Available in flat black or parchment white
- Ruggedized for long life
- Complete with harness, crystals, dynamotor, antenna

60 CHANNELS COMPLETE $595.00

ALSO AVAILABLE WITH 90 CHANNELS AND OTHER POWER UNITS

Truly fine equipment at a moderate price. In keeping with the Wright policy of offering newer and more improved equipment for aircraft communication, the Wright "Custom Remote" will faithfully perform wherever remote equipment is needed.

90 channels, crystal controlled. Choice of dynamotor or transistor power supply in either 12 or 24 volts. Furnished complete with shock mounts, antenna, power supply and remote tuning head.

- Completely shock mounted
- Crystal controlled receiver and transmitter
- Speaker or phone output
- Direct connection-notch seeking selector
- Receiver easily removed for service
- Adjustable squelch control

DYNAMOTOR POWER SUPPLY....$1295.00

WRIGHT Airborne Electronics

DEPT. C
1620 McGEE
KANSAS CITY, MO.

"WRIGHT ALL OVER THE WORLD"

only slightly and we settled in with a considerable thump. So here again, it will pay to go along with the handbook.

For shortest distance to break ground, the handbook says to use 20 degrees of flap. This I did on several take-offs. At an indicated airspeed of 40 mph, the 175 breaks ground. You can leave the nosewheel on the runway till you reach 40 mph, or you can lift the nose early in the roll. It all adds up to the same performance. I discussed this with several Cessna representatives and there seemed to be some argument as to the best technique for breaking ground in the shortest distance. Some said put the flaps down before starting the run. Others said get speed up to 40 mph, drop the flaps and pull back on the wheel. If you get everything properly coordinated, the plane fairly jumps off. This latter technique demands more skill than the former and at the most doesn't gain more than a few feet. Most pilots will be better advised to stick with the simple, easy method outlined in the handbook.

Several days after the first series of check flights, I made a second series but under very adverse weather—practically no ceiling, heavy crosswind gusts due to flood on the main runway and very scant visibility. It was useless to climb to the optimum cruising altitude for the 175.

To give us an idea of what was going on, we measured off a 300-foot and a 600-foot distance and marked them for reference. On the first take-off, made without flaps, we broke ground in 450 feet. With 20 degrees of flaps, we broke ground in 250 feet. This compares to the handbook figure of 300 feet with a 15 mph wind and an airplane weight of 2,000 pounds. I think my figure could have been bettered slightly, but with a gusty crosswind and a strange airplane, I felt no urge to get this close to the brink.

Although the airplane handled beautifully in the turbulence and the landings were made without difficulty, it seemed prudent to use a little extra speed for good control. The extra speed, of course, extended the roll-out distances beyond the minimums which could be made when landing into the wind.

Although it was impossible to be as exhaustive in the flight tests as I would have liked, it was apparent that the 175 would meet or exceed all specifications set up by the factory. My checking was exhaustive enough to make the accuracy of the handbook stand up. And it is interesting reading.

At sea level, the 175 using 20 degrees of flap will clear a 50-foot obstacle in 1,340 feet. It takes 1,650 feet for the 172 to do the same job. At 7,500 feet, the 175 will clear a 50-foot obstacle in 2,570 feet, as compared to 3,100 for the 172. Climb rate at this altitude is 495 fpm for the 175. At 10,000 feet the climb of the 175 is 380 fpm as compared to 240 fpm for the 172. The 175 is still climbing 140 fpm at 15,000 feet. All figures are at gross weights.

On the landing side, the 175 will clear a 50-foot obstacle and come to a stop in 1,155 feet at sea level—with full flaps.

(Continued on page 64)

makes long "On Top", rough air, X-country and IFR flights safer, easier!

Having hands free to copy clearances, use charts, study approach plates, work radios, etc., is possible with almost any autopilot but—the important thing is knowing *which* autopilot to buy! The Federal Tubeless Autopilot offers the only new concept in up-to-date autopilot design. In addition to being a true 3-axis autopilot, Federal is of simple trouble-free electro-mechanical design assuring highest reliability and lowest maintenance cost compared to all other types. For *extra utility* from your aircraft (and resulting lower cost of operation), buy Federal—the tubeless autopilot with the easiest "set up and go"—"ready to get up and go" features for maximum in-flight benefits and minimum down-time delays! Remember—*the most valuable extra hands in the cockpit are your own*—set them free from the controls with Federal and arrive fatigue-free wherever you fly!

Federal **Tubeless Autopilot**

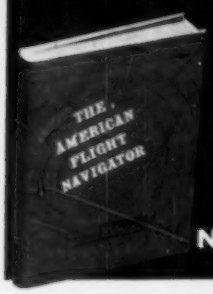
For your free illustrated copy of "Freehand Flight" brochure, write: Industrial Products Division, International Telephone and Telegraph Corporation, 15191 Bledsoe Street, San Fernando, California.

The Federal Autopilot is CAA certificated for the Aero Commander, Beech Bonanza and Twin Bonanza, Cessna 172, 180, 182, 310 and Piper Apache.

Industrial Products Division IT&T INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

63

America's #1 guides to all aircrew ratings!



. . . now introducing the new **FLIGHT NAVIGATOR**

for pilots . . . the first practical book on long-range navigation

☐ *THE AMERICAN FLIGHT NAVIGATOR, by John Dohm, Editor of the Journal of the Institute of Navigation. Like to escape the confines of the airways and navigate yourself to distant ports of call? Then this is the book for you. Easy-to-follow text, fully illustrated, on all methods of long-range navigation, plus typical exams for the CAA Flight Navigator Rating. With charts, tables, and CAR. 352 pages, $6.50.*

★ ★ ★ ★

Other Zweng Manuals for your CAA ratings, with latest typical exams:

☐ PRIVATE & COMMERCIAL PILOT RATINGS. Both ratings in one timely book. With new cross-country written examinations, maps. $4.00

☐ INSTRUMENT RATING. Up-to-date text, illustrated, and new cross-country exams. $5.00

☐ AIRLINE TRANSPORT PILOT RATING. Used by the airlines in their own pilot-training courses. Revised 1958 edition. $5.50

☐ AIRCRAFT & ENGINE MECHANICS' RATINGS. Both ratings in one book. With new inspection authorization plan. $5.00

☐ FLIGHT ENGINEERS MANUAL. If you have an A. & E. rating this book will prepare you now for the Engineer rating. $5.00

☐ FLYING THE OMNIRANGE. Shows you how simple omni flying can be. With typical omni flight and test questions. Illus. $4.00

☐ MANUAL OF THE E-6B COMPUTER. Over 400 problems solved and explained. $3.00

☐ SAFETY AFTER SOLO. How to fly 10,000 hours, with pleasure. John Hoyt. $4.75

☐ HELICOPTER PILOT RATINGS. 1958 edition with revised text and new cross-country written examinations. Only guide available. $5.00

Check the manuals you want, fill in the blanks below, then clip this ad and send it to:

PAN AMERICAN NAVIGATION SERVICE
12021 Ventura Blvd., F-7
North Hollywood, Calif.

☐ Payment enclosed ☐ Send C.O.D.
☐ Send me a free copy of your complete catalogue.

Name_____

Street_____

City & State_____

(Continued from page 63)

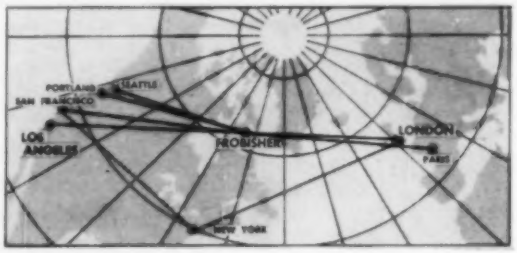
At 7,500 feet elevation, under similar conditions, it stops rolling in 1,360 feet. Performance advantage swings more and more to the 175 as altitude increases. The same holds true in the cruising department. At 2,500 feet, the 175 will cruise 133 mph with 75 per cent of power while the 172 is doing 126 mph with 80 per cent of power. Optimum cruising altitude for the 175 is 10,000 feet where you should get a true airspeed of 140 mph using 72 per cent of power. Optimum cruising altitude for the 172 is 7,500 feet where you should get a true airspeed of 124 mph using 70 per cent of power. If one wants to take advantage of high altitude cruising, or if one's flying takes him into high altitude fields, it's easy to see that the 175 is the airplane. It also is licensed for floats and computation indicates it will do a fine job on water.

There's no doubt in my mind that the 175 will continue Cessna's reputation for honest workmanship and good honest performance. It's a fine compromise for a person who wants a little more performance than the 172 but doesn't want to go quite as many dollars as the 182 represents.

So often, people want to know, "which is the best airplane?" That's a tough one to weasel out of. Each prospective buyer must analyze his own needs including finances, and then pick the equipment that best suits his needs. To help such individuals, I've prepared a little handy-dandy comparison chart. And I say, "Anyone will do a good job within its limitations." END

COMPARISON CHART ON THREE POPULAR CESSNA MODELS

	172	175	182
Price, FAF	$8,995	$10,995	$14,350
Gross Weight	2,200 lbs.	2,350 lbs.	2,650 lbs.
Available for passengers, baggage, additional equipment	643 lbs.	633 lbs.	
Top cruising speed	124 mph	140 mph	154 mph
Top Speed	135 mph	147 mph	165 mph
Range at maximum cruise	519 miles	585 miles	650 miles
Maximum range	629 miles	730 miles	815 miles
Distance to clear 50-ft. obstacle			
Take-off sea level	1,650 feet	1,340 feet	1,030 feet
Take-off 5,000 feet	2,455 feet	1,980 feet	1,500 feet
Landing sea level	1,115 feet	1,155 feet	1,310 feet
Landing 5,000 feet	1,245 feet	1,290 feet	1,450 feet



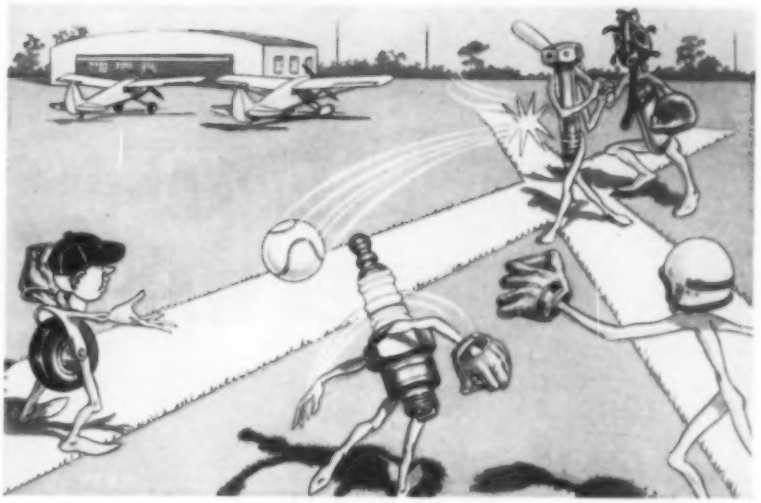
FROBISHER
OUTPOST OF THE NORTHWEST PASSAGE

WHEN Sir Martin Frobisher discovered the Bay on Baffin Island in 1576, he was searching for the Northwest Passage from Europe to the Orient. Today the air base at Frobisher is an important refueling point for airlines flying the Northwest Passage — or Polar Route, as it is called—from Europe to the U. S. west coast, Alaska and the Orient. Shell Oil Company and Imperial Oil, Ltd., maintain a 10 month supply of fuel at the base since the shipping harbor is free of ice only 10 weeks a year.

"We Go to Bat for Better Aircraft Maintenance"

There's nothing more important to flight safety than good maintenance.

As the nation's largest supplier of aviation parts and accessories, Air Associates handles only the finest, fully-tested products. Our prompt deliveries . . . complete stocks . . . and prices made possible by volume purchasing have earned us the reputation of dependability in both service and quality.



AIR ASSOCIATES

Department Store of the Air

To serve the nation in aviation, there are Air Associates branches at . . .

Atlanta, Ga. · **Chicago, Ill.** · **Dallas, Tex.** · **Glendale, Calif.** · **Miami, Fla.** · **San Francisco, Calif.** · **Teterboro, N. J.**

PAC-A-LOG — NOW! POCKET SIZE LOG BOOK

a must for every pilot

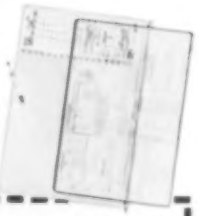
- Special center section for credentials
- Compact flight log book
- Holds FCC licenses and credit cards
- Pen included
- Durable construction

$2.95

PAC-A-CHART

THE KEY TO NAVIGATION

- Outer case of clear vinyl
- Holds complete flight data
- Course marking pencil
- Complete weather information



$4.95

WIN $1,000.00

SEE YOUR AIRPORT OPERATOR FOR DETAILS OR WRITE KRILAR CO.

Krilar Co., 81 E. State St., Columbus, Ohio
Enclosed is.....
☐ PAC-A-LOG ☐ PAC-A-CHART ☐ BOTH
Name.....
Address.....
City.....State.....
Airport Operator.....
$1.00 Deposit on C.O.D. Orders

✱ SPECIAL INTRODUCTORY OFFER!

Reg. 7.90 Value. Receive both the PAC-A-LOG (2.95 value) and the PAC-A-CHART (4.95 value). Both for $7. Order today!

KRILAR COMPANY 81 E. STATE ST., COLUMBUS 15, OHIO

CASH
FOR YOUR AIRPLANE--
ALL TYPES WANTED
COMBS AIRCRAFT
DENVER
DEPT. F — HANGAR 7, STAPLETON AIRFIELD
DENVER 7, COLORADO • PHONE: DUdley 8-2471

IFR HOOD

1st in Safety! 1st in Comfort!
1st in Pilot's Choice!
The modern method of simulated instrument flight for training and maintaining proficiency. $15.00 at your Airport or
FRANCIS AVIATION
Box 299 Lansing, Mich.

Official SEA, AIR & LAND PHOTOS
CARRIERS, SHIPS — NEW JETS, ROCKETS
YOUR CHOICE OF THOUSANDS
SPECIAL INTRODUCTORY OFFER
Send 25c with your name and address and choose one set.
1 4-3½x5 Carrier, Subs and Battleships
2 4-3½x5 World War II planes
3 4-3½x5 photos, world's fastest jets
4 1-8x10 photo, Forrestal Carrier
5 1-8x10 photo USN F11F-1 Tiger
Or All five sets for $1.00
Regular $2 Value
FREE With Order
Large illustrated Catalog . .
"Thousands of Aircraft AND Navy Photos"
MAIL YOUR ORDER TODAY

U.S. SEA & AIR PHOTOS
Dept. 2; Box 75084, Los Angeles 5, California

see what you're missing!
WHILE YOUR GLOBE AUTOPILOT FLIES

© 1957 SPECIAL PRODUCTS DIVISION, GLOBE INDUSTRIES, INC.
125 Sunrise Place, Dayton 7, Ohio

Zenith Navigator 760

(Continued from page 43)

craft. But the writer has flown plenty of big, expensive, carefully-installed, low frequency radios with supposedly ideal exterior antennas that were subject to this signal change due to bank alone.

Now this collection of statements is intended for the instrument-rated airman and for the pilot who is working on or toward an instrument rating. The Navigator, however, will do its job just as well for the week-end or fair weather flier. In either case, you need a little practice with it—the kind of practice you can get in one or two cross-country hops where you have the charts and frequencies to check your results. From there on, you can use the little set just about as readily and sucessfully as a professional pilot with hundreds of hours of actual instrument time behind him.

The experienced pilot reader will be inclined to take much of this with a grain of salt, but don't make the mistake of laughing it off. Try it. We did in quite a variety of airplanes—Apaches, the whole Cessna series, Bonanzas, Tri-Pacers, Comanches and a DC-7. All-metal structure has, of course, its effect on the Navigator. But if you put the set up beside the windshield or beside a window, you get very useful and sufficiently informative results.

One note of caution. Usually "on the windshield shelf" is close to the magnetic compass and the Navigator's speaker with its heavy magnets causes the needle to swing to an erroneous heading. It's best to set your directional gyro when starting a Navigator orientation or practice and then use it alone. Don't expect a usable compass reading if the Navigator is near your compass.

There have been some instrument instructors who have amazed themselves with this portable. When Ted Leitzel, a Zenith Radio Corporation executive who also is an enthusiastic Tri-Pacer owner and cross-country practicer, brought it out to Walt Thielman's Governor's AirPark, 35 miles south of Chicago Midway, we all thought: "This is just another gadget."

When we were able, on the ground, to tune the outer marker at O'Hare Field, 50 miles north, eyebrows lifted. Playing with it, we got a strong signal from Goshen, Ind., range, 95 miles away; and then Lansing, Mich., 175 miles away, still on the ground. Trying northward again we tuned Madison, Wis., a good 155 miles, while still sitting at Paula Thielman's coffee bar downing some of her wonderful home-made pie. We decided then that a flight check was worthwhile.

Sitting on the right side of Ted's Tri-Pacer and entirely on the gauges, we flew west, north, circled and then took a series of null bearings on broadcast and range stations in the area. Initially, we just turned up volume and used the speaker signal. Later Ted inserted the hearing-aid type, clear, plastic, ear plug and I was able to reduce volume, get the benefit of fine volume control and the narrowing effect of a soft, low signal for range orientation.

From somewhere west of Governor's field we tuned and took bearings on near-

by WLS; then on WCFL; on WILL (University of Illinois station at Champaign, 125 miles due south); on the Kedzie fan marker at Midway airport 35 miles northward; on WIND near Gary, Ind., and finally on powerful WGN, 45 miles to the north. All yielded bearings that, transferred to Ted's Chicago area chart, gave us reasonably close determination of a line of position.

At this point we switched to the low band and did a wing tip null on Joliet radio 257 kc about 35 miles away. The null "moved to the left" in about 30 seconds, indicating the station was to the left. Ted then turned the set so its null point was parallel to the longitudinal axis of the plane and I turned left until the Joliet signal faded out. Without touching the set but using bank, we established the limits of the null at approximately 15 degrees with volume up and about ten degrees with reduced volume. We flew the null to the station, passing just to the right as null indication showed. Ted did not see the station, however, and it was a minute or two before he was convinced we had passed it.

When he said: "I think we've gone by," I suggested that since we were close to a leg (he had turned the set broadside or parallel to the wing span and we were getting full volume on the speaker) I use the phone and try for a cone. We continued outbound for another minute while Ted plugged in the ear insert for me and I adjusted volume. Then we did a quick 180 instead of a procedure turn. The leg was just to our left and, after sliding into the full on-course I was able to find the feather-edge with surprising ease. Volume began to build steadily.

Being more concerned with his neck-swiveling as safety pilot, Ted again failed to see the station as we approached; and furthermore he did not have the benefit of hearing any signal. I told him, "thirty seconds out," when the key clicks were good and loud and Ted struggled to see the station over the nose. "There it is," I told him as we got a good cone.

"Can't see it," he said skeptically.

"Right down there," I told him, cocking the Pacer into a momentary 70-degree bank.

"You're right. Just behind us. We must have been right over it when you first called," he grinned. He seemed a little surprised too.

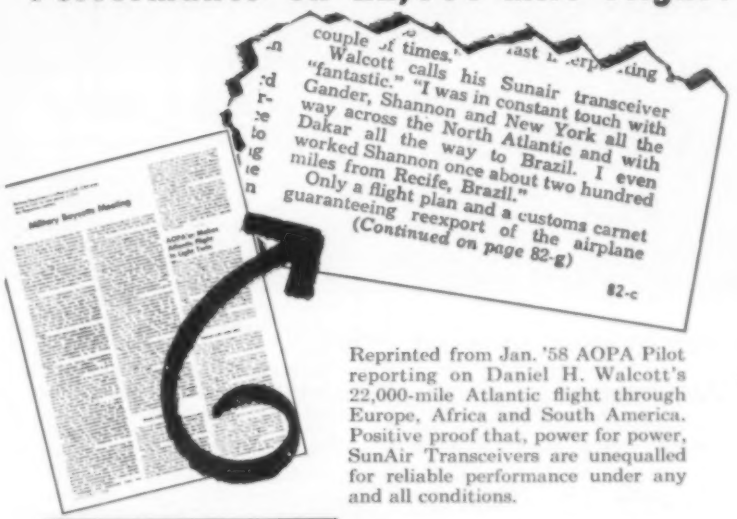
My experience was repeated from Governor's when Les Muter came out in his Apache with his charming wife, Gladys, a flying grandmother and a perennial racer in the 99's Powder Puff derbies. After seeing the Navigator work on speaker volume alone, Mrs. Muter vowed she and her flying partner Doris Langher, ATR holder and United Air Lines simulator instructor, must have one for this year's race, even though the Apache has dual omni, ADF and low frequency of its own.

At Sky Harbor north of Chicago, several instrument pilots including Dick (Bones) Grzanka, John Wilson's instrument instructor, got similarly excellent results working the Milwaukee and Joliet ranges and doing orientations at Navy

(Continued on page 68)

"Fantastic!"

SUNAir describes H.F. Transceiver Performance on 22,000-mile Flight!


couple of times."
Walcott calls his Sunair transceiver "fantastic." "I was in constant touch with Gander, Shannon and New York all the way across the North Atlantic and with Dakar all the way to Brazil. I even worked Shannon once about two hundred miles from Recife, Brazil."
Only a flight plan and a customs carnet guaranteeing reexport of the airplane
(Continued on page 82-g)
82-c

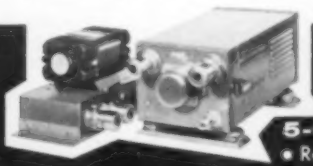
Reprinted from Jan. '58 AOPA Pilot reporting on Daniel H. Walcott's 22,000-mile Atlantic flight through Europe, Africa and South America. Positive proof that, power for power, SunAir Transceivers are unequalled for reliable performance under any and all conditions.

LONG RANGE! Loud and clear up to 1,250 miles; under certain conditions to 2,500 miles.

LIGHT WEIGHT! 25 to 36 pounds complete. Simple to install and service.

LOW PRICE! Available in 5 or 22-Channel Models... between 2,000 and 10,000 kcs. 5-Channel Direct Panel Mounting (Wt. 25 lbs.), $795.00. 5-Channel Remote Control (Wt. 27 lbs.), $1,095.00. 22-Channel Remote Control (Wt. 36 lbs.), $1,895.00 Manual or Electric Antennae Reels Extra. Available as accessory when purchasing new aircraft through Aero Commander, Helio Courier, DeHavilland (Canada), Beech, Cessna and Piper.

See your dealer today



5-CHANNEL
- Remote Control
- Weight: 27 lbs.
- Price: $1,095.00

All prices F.O.B. Fort Lauderdale

SUNAir® ELECTRONICS, INC.

Broward County International Airport, Fort Lauderdale, Fla., U.S.A.

WE BUY TWINS

CASH NOT CONVERSATION

THERE IS A DIFFERENCE!

One or complete dealer stocks, new or used. We'll buy over the phone. No Red Tape. We pick up. Send for our free list of airplanes for sale.

VEST AIRCRAFT CO.

Box 5306

EM 6-2663 Denver 17, Colo.

MOUNTAIN AIRSTRIP

THAT's a DC-3 coming 'round the bend and onto Idaho's old 2,600-ft. Moose Creek airstrip — not an approach for amateurs. Located "50 miles from nowhere," the strip serves the Moose Creek Ranger Station and an area famed for its big game hunting and fishing.

Accessible only by air, the original airstrip was fashioned in 1932 with mules and manpower. Surrounded by rugged mountains and tall timbers, the strip could only be used in the early morning or evening hours due to tricky air currents and devastating cross winds. Last year 600 landings and takeoffs were made. As this expected to double this year, the Forest Service and the CAA decided to increase the length to 4,100 feet.

Johnson Airlines, a Missoula, Mont., freight service, took on the job of flying in the International Harvester bulldozers needed to push over 25 acres of virgin timber and move 50,000 cubic yards of dirt—a very neat trick considering the length of the old strip.

(Continued from page 67)

Glenview range. Bones wrote a testimonial. Then, when sent to Wichita to bring home a new Cessna (minus radio as they often come) he borrowed one of Leitzell's three pre-production Navigators "to get home on." George Edgecombe, Chicago Piper dealer, tried the Navigator in a new Comanche and said: "Every pilot should have one for cross-country."

Leitzell, you might say, is the "father" of the Navigator. It was his brain child, carried out and converted into a wonderful safety tool by Zenith's engineering hotshots. It began when Leitzell, using one of the Zenith transistor portable broadcast receivers decided "it ought to have the airway weather band too."

The engineers listened to his gripe and replied that such a unit "would have little public acceptance" but agreed it was technically feasible. Then they produced a test unit. Leitzell tried it in the air and rejected it—not sensitive enough, not enough volume for aircraft cabins (notably noisy places), no automatic volume control cutoff. Also, in that first unit, broadcast stations kept breaking in on the airway band.

"We can make it better but it'll cost more," said the engineers. And they did —adding the tuned RF stage and three-gang tuning condenser that makes the Navigator much more sensitive than any other transistor portables—minimizes the cross-band interference and gives the sharp nulls and cones that turned the second prototype unit into a real navigation tool.

It does the job, as Leitzell says, because it was put together by engineers who took a pilot's word for what was needed. Production of the set was delayed two months until Leitzell was satisfied through flight tests with a lot of "pros" that he had a w.nner.

Distribution is being handled through Zenith's regular distributor network and probably also will be made available through major aviation sales channels. As we went to press, price had not as yet been set but w.ll be about $100. END

Threshold of Space

(Continued from page 40)

winged hypersonic gliders in our preview on the X-15 type of craft. Certainly this kind of vehicle will be considered for the recovery of unmanned satellites. But the chances are that an entirely new device will beat the unmanned hypersonic glider to the draw: the "non-lifting" re-entry vehicle.

Spherical or hemispherical in shape, these recoverable satellites will be quite light in relation to their size. They will have an outer hull of heat-resistant material (ceramics bonded to metal, molybdenum or beryllium alloy) and a layer of insulation to separate the payload from the glowing outer shell. *Provided* that these craft are injected into the atmosphere at a sufficiently shallow angle, no further control is necessary. Air friction and gravity would do the rest.

Factors which make the non-lifting re-entry vehicle so attractive are as follows:

- Neither wings nor other weighty control surfaces need be reckoned with in lifting the satellite into its orbit.
- No complicated control devices have to be carried along to direct the glide or skip pattern during the re-entry phase.
- Heat values and deceleration loads remain low.

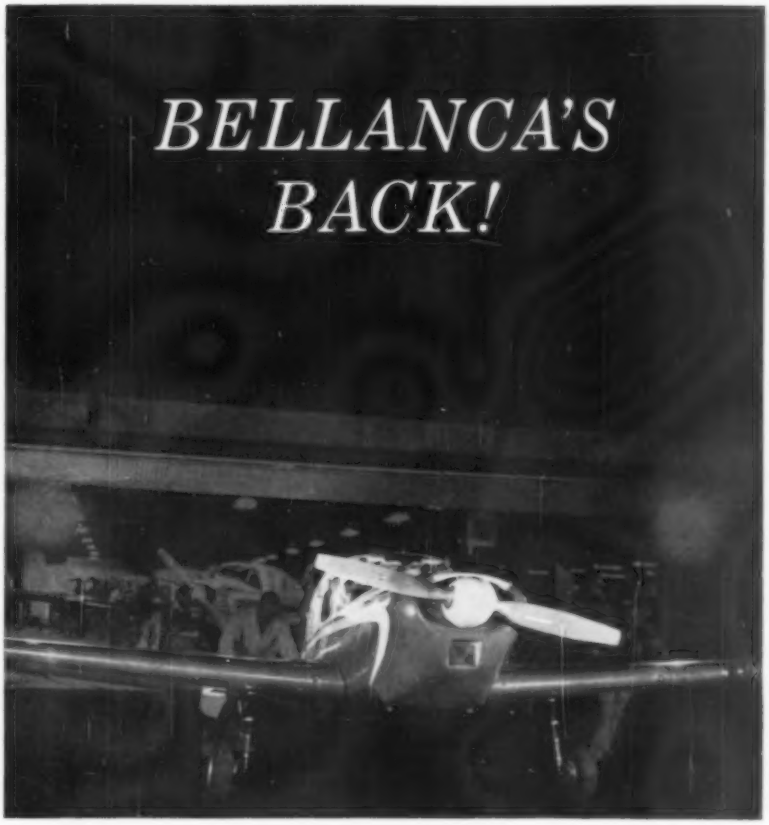
This last item deserves comment. If the re-entry trajectory is right, resulting in the proper circular velocity at each altitude on the way down, deceleration can be as low as seven G's for no more than two minutes. Maximum temperatures on the surface of the sphere would be less than 2,500 F., and average temperatures for a critical period of less than ten minutes, only some 1,000 F., according to Convair's astronautics chief, Krafft Ehricke. Even these temperatures could be reduced by imparting a "de-stabilizing" factor into the shape of these artificial moons. A slight wobble would spread the circlet of heat over a broad band of the spheroid, further diffusing the effects of high temperature.

It will be appreciated that the conditions we have described are well within the tolerance range of that most delicate control system and instrument hook-up of all—man. Indeed, non-lifting re-entry vehicles are under serious consideration for man's long road back to the ground.

The last part of the journey, from 35,000 feet down to the surface, will be slowed by one or more parachutes. It will not be possible to dump the moonlet at a fixed, convenient point, but through the use of existing tracking and computing devices, we shall be able to land it within some 200 to 300 miles of a preselected place.

Vehicles for Interplanetary Space: Within the five years' time we have set ourselves for our look ahead, we shan't see manned spacecraft in this category, short of a whopping technical breakthrough. Man will dip his toe into the cold vacuum of outer space however by proxy. We may expect to see a number of exploration robots leave on one-way or return trips to the moon, and perhaps

(Continued on page 70)



A few years ago, the entire world of aviation acclaimed the appearance of a new airplane—the Bellanca Cruisemaster. Then, when less than 100 had been manufactured, the Korean War brought production to a halt. But brief as its appearance was, the Cruisemaster made an unforgettable impression. And ever since, pilots who knew the Cruisemaster have awaited its return.

Now, the Cruisemaster is again in full production. The Bellanca's back—with even more power, more refinements and more dazzling performance.

Top performer in its price class, the Cruisemaster cruises at nearly 200 mph, performs spectacularly on short field landings and take-offs, and is completely at home at high altitudes. While it delivers "big" airplane performance, its efficiency makes for economical operation and maintenance.

See and fly the Cruisemaster for yourself. You'll agree that it was worth waiting for.

Write for FREE color brochure and address of your nearest dealer

PERFORMANCE DATA

Top Speed	206 mph
Cruising Speed (75% power)	196 mph
Stalling Speed	46 mph
Rate of Climb (ft/min)	1500
Service Ceiling	20,000
Cruising Range	800
Price	$17,950

Key dealerships still available

BELLANCA

Cruisemaster

Mfd. by NORTHERN AIRCRAFT, INC.

ALEXANDRIA • MINNESOTA

"AROUND THE WORLD FOR 30 YEARS"

WEEMS
AIR NAVIGATION AIDS & INSTRUMENTS

NOW... FOR PILOTS & NAVIGATORS... 3 of the most widely read and used books in the field of air navigation. Do you own a copy of each? If not, get yours at your Aviation Supply Dealer, or write us direct. Address Dept. 3, Weems System of Navigation, Annapolis, Md.

AIR NAVIGATION-WEEMS: The first complete, authoritative text on air navigation—and still the best. This new, revised edition covers the entire field of air navigation including piloting, dead reckoning, celestial navigation and electronic navigation. Many new chapters on loran, radar, pressure pattern flying, VHF radio, polar navigation and other features. $6.00.

PRACTICAL AIR NAVIGATION-LYON: The commercial edition of the former government "best seller", CAB 24, (the "Million Copy" Text). Completely revised and brought up-to-date by the original author. Invaluable to pilots and navigators. Standard in flight and ground schools. 407 pages. $3.00.

INSTRUMENT FLYING-WEEMS & ZWENG: For years best and most popular book in its field . . . now completely revised in this 6th edition. Revision authoritatively done by John Domm, a Pan American Airways navigator who has made many oceanic crossings. Treatment sufficient to meet needs of *any* flying man. 298 pages. $6.00.

FREE 26-PAGE WEEMS CATALOG: Describes in detail these and many other essential navigation aids and instruments. Also tells you about Home Study Navigation Courses offered by Weems School of Navigation, est. 1927. Send today for your free copy. Address Dept. 3, Weems System of Navigation, Annapolis, Md.

WEEMS *Trusted Name in Air Navigation*

FRYE'S FAMOUS BOOTS

Fine quality

A real treat for your feet

NOW BY MAIL

Postpaid

Feather-light, yet durable. You will like their superb styling and wonderful flexibility. 9 inch JET wellington, **$16.95.** 7 inch strap and buckle jodhpur, **$17.95.** Fine BLACK or BROWN calfskin, fully lined, leather soles, rubber heels. Men's sizes 6-12, ABCDE, from stock. Other sizes 5-16, AAA-EEEE, made to order, $2.00 more. **ORDER NOW.** Enclose check or money order. **WRITE FOR FREE CATALOG.** **TODD'S, Dep't FY 209 S. State St., Chicago 4, Ill.**

(Continued from page 69)

even to Mars.

You may wonder why it is possible to think now in terms of unmanned spacecraft within the present decade, when we are right proud to have pushed a 20-pound load into orbit only several months ago. For the answer, one should look not to the vast distances between ourselves, the Moon and Mars, but to the speed required to free any object from the pull of the Earth. From then on, destination and return becomes a mere matter of aim.

Example: A Thor IRBM, with two additional rocket stages, can accelerate a one-half ton load to 18,000 mph-orbiting speed at 200 miles up. If you tack a fourth stage rocket on the configuration, you can speed a payload of less than 100 pounds to 24,000 miles-per-hour plus, reaching escape velocity.

Thus it appears that escape velocity becomes merely a matter of trading orbital payload for another rocket stage, or simply more fuel. Controls do not present an insuperable problem, either; it is actually easier to plant a payload into an orbit around the moon than it is to hit a terrestrial target 5,000 miles away with an ICBM, as far as guidance is concerned. We may therefore expect to see the Earth/Moon orbiting vehicle in the near future, perhaps in this very year. Chances are that it will embody some of the elements of Explorer's instrumentation, and some of the features of the larger reconnaissance satellites. Again, the Titan ICBM appears a likely candidate for the mooncraft's first and second stage.

After racing round the Moon, our vanguard in outer space will come falling back toward earth; and on its return trip round our globe, it will play back its stored information like a backfence gossip upon the neighbor's return from vacation.

Hitting the moon will come next. This operation requires no more energy than orbiting it, but a much more precise aim. Since the first moon vehicle will not carry a braking rocket device, we probably cannot expect delicate instruments to survive the landing impact. Rather, the object of the exercise will be to create a soul-satisfying splash—for morale at home, for propaganda abroad. High-visibility dyes, magnesium flares and explosives have been suggested for this purpose. All will probably be used. One dead-earnest suggestion even pro-

(Continued on page 72)

"All right, anybody else wanna chicken out?"

GRAUBART
AVIATION
SUGGESTS...

PINPOINT

Navigation with Dual Omnis

VFR or IFR...for Precision, and Standby Safety, *insure* your position—with a Small Investment—for protection, in a Large Way!

Highest Trades allowed for your present equipment, with any purchase of New equipment.

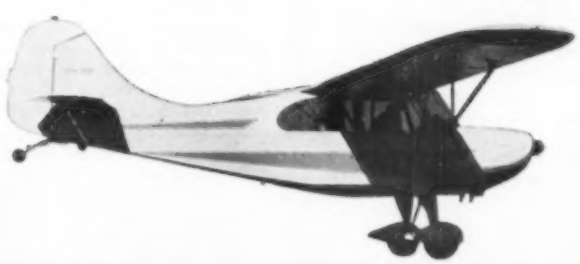
FOR ANY AVIONIC NEED, NEW OR USED (VOR's, AUTO-PILOTS, ADF's, etc.), CONSULT:

Graubart Aviation Inc.

540 NO. LAKE SHORE DR. • CHICAGO 11 • PHONE: MOHAWK 4-6260

CHAMPION

CHAMPION AIRCRAFT PRESENTS



SKY-TRAC

Gets you **OFF TO A GREAT START.** Whatever the use this versatile, high performance CHAMPION will do the **job well.**

MODEL 7GC	140 h.p. Lycoming
Cruise	120 MPH
Stall	40 MPH
Take-off S.L.	150 Ft.
Rate of Climb	1150 f.p.m. (S.L.)
Fuel 36 Gals.	Range 510 Miles

Champion AIRCRAFT CORPORATION
OSCEOLA WISCONSIN

NEED AIRCRAFT PARTS? *ANY KIND?*

We have hundreds of thousands of them for everything from Piper to Lockheed and Douglas . . . and we can get them off to you in minutes. What we don't have we can get in a hurry. Five inventories (major departments at Teterboro and Wilmington) at your service, and a streamlined, efficient system that really gets things done.

Maine to Virginia . . . only a short hop to Atlantic Aviation

Atlantic Aviation CORPORATION

BOSTON	NEW YORK	PHILADELPHIA	WILMINGTON	LYNCHBURG
International Airport	Teterboro Airport, N. J.	International Airport	New Castle County Airport	Preston Glenn Airport
LOgan 7-8700	ATlas 8-1740	SAratoga 6-7500	EAst 8-6611	LYnchburg 3-3134

MEYER'S

— 200 —

ENGINEERED & DESIGNED to assure SUPERIOR PERFORMANCE

Spin Resistant
Gross Weight 3000 Lbs.
Empty Weight 1870 Lbs.
Tricycle Landing Gear
Continental 240 HP.
All Metal—Four Place
Cruise 185—Land 55
Range (Optional) 1000 Miles
360° Visibility

Write Today for Details

MEYER'S AIRCRAFT CO.
Tecumseh - Mich.
Dealer Inquiries Invited

Air-Com VHF Receiver

FOR HOME • FOR AIRPORT

(7" x 10" x 5½") *For Monitoring*
- IN-FLIGHT CONVERSATIONS
- CONTROL TOWERS
- EMERGENCY CALLS
- WEATHER, ETC.

59.95
POST PAID
Money back guarantee

Features:
- 118-127 MC.
- Drift-Free
- Automatic-Squelch
- 7 Tubes, plus rectifier
- 110-120 Volts, 30 Watts
- Whip Antenna

Harron Labs
42-10 220TH ST.
BAYSIDE 61, N. Y.

SKYCRAFT DESIGN

Convert your fabric wings or fuselage to lifetime aluminum. Not a kit. Custom-quality. CAA-approved (Supplementary Type Certificate). Guaranteed airworthy wings for Ercoupe, Cessna 140 and 120, Stinson. Also Stinson fuselage. Surprisingly low price. Can usually arrange fast exchange. Hundreds of satisfied customers. Skycraft Design, Dept. DF, Old Star Airport, Langhorne, Pa. Phone Windsor 5-7750.

(Continued from page 70)

poses a multi-megaton warhead as prime payload; the idea would be to brighten the earth night with the brilliant flash in token of success, and blast loose enough moonrock so that some of it would come tumbling into the earth's gravity field. We hope that this devastating disproval of the moon-is-made-out-of-green-cheese theory is never used. It seems such a downbeat way to greet our neighbor, such a barbaric way to knock on the great gate to outer space.

Bigger and better payloads next will make the long journey. The USAF has recently announced development of a single-chamber rocket engine providing 1,000,000 pounds of thrust, and of a new cluster arrangement with an eventual thrust around 1,500,000 pounds. This is not quite spaceship caliber yet but we're getting there. Engines of this type, and of the Russian's 820,000 pounds of thrust engine now on test, will help place 15-ton satellites in orbit, send fully instrumented observation platforms around the moon and around Mars.

By the end of 1962 we shall be ready for the next phase in man's greatest adventure. We shall have acquired the knowhow necessary for the construction of a series of manned satellites supplied by a fleet of huge shuttle rockets. Whirling somewhere around the earth may be the spidery skeleton segments of our first true spaceship. Assembled in outer space, it will be designed to carry men around the moon.

At that stage in the race for space, engines will probably still be solid and liquid-fueled rockets, not too different (except for size) from the powerplants of today. But new sources of power will have moved from the theoretician's blackboard onto the test stand.

Atomic rockets will loom large in the future of unmanned craft. Already under investigation by the USAF under the code name, Rover, these engines will inject a working fluid (probably a liquid hydrogen variant) into a white-hot fission pile. Converted into ultra high temperature gases, the working fluid would shoot out through rocket nozzles at enormous velocities, creating specific thrust about three times that of the best contemporary engines.

Once in outer space, a whole family of revolutionary engines will be tried out. There will be another variant of the atomic engine creating propulsive energy through ion acceleration via a hydroelectric cycle—or huge solar furnaces may replace the fission pile as a source of energy. There may be the cesium-cycle engine, the photonic rocket (relying literally on the push of light) and, who knows? the fusion engine in our lifetime.

All this seems very far in the future? It may be. But in 1953, did you accept the notion that, within five years, man would be at the controls of his first true spacecraft? Did you foresee a man-made moon in orbit within five years?

You might have? If so, congratulations. Let's not underestimate man's potential on the road into space—our own, and above all, that of others. END

The Idaho-Mexico Annual Tour

(Continued from page 29)

the morning and go to school in the afternoon, many silversmiths, pottery makers, weavers and other handicraftsmen.

Arrival in Mexico City was timed with light rain, an extra heavy smog, low visibility, and seven radio receivers out. The courteous control tower treatment and their warm "Hello Idaho—Welcome to Mexico City" was a bright contrast to many U. S. towers of much less activity.

Mexico Travel Advisors arranged tours —the fabulous University, bullfight, pyramids, Maximilian Palace on Grasshopper Hill, Government Buildings, Natural Historical Museum with Aztec writings and cultures older than the days of Christ and Columbus, the Shrine of Guadalupe, and Xochimilco Floating Gardens.

While in Mexico City, Moulton talked with General Alberto Salinas Carranza, Director of Civil Aviation in Mexico, and

Beaming proudly, (left to right) Bill King, Rolland Kramer and Henry Vollweiler pose with two of their sporting sailfish caught at Acapulco.

members of the Mexico Aero Club, regarding aviation generally and of the assistance special tour permits would render large groups such as the one Idaho represented. General Carranza approved the Idaho Tour request for authority to file one group flight plan by the tour leader provided a listing of all aircraft, identification numbers, pilots, passengers and addresses was submitted with each filing and closing.

The Hotel Majestic in Acapulco was a "dream come true." Deepsea fishing and night club tours were arranged through Turismo Memo Pena and many a sailfish trophy was hung at the dock by an Idaho fisherman. Visiting banana plantations, skin-diving, and catching up with a little "siesta time" filled our agenda. A banner across the hotel facade stating "Welcome Idaho Club of Aeronautics" was only one of many gestures of friendliness.

Manzanillo, like Guadalajara, was a new stop. Manzanillo is an uncommercialized coastal city with a beautiful bay. The Hotel Anita put the Idaho group up for one day. Luis Garcia arranged a coun-

(Continued on page 74)

Rebat®

...world's finest aircraft battery

Available throughout the world. Sixty-two distributing points in the United States and Canada . . . factory service headquarters at Reading, Pa., Oklahoma City, Okla., and Oakland, Calif.

THE ELECTRIC AUTO-LITE COMPANY • BATTERY DIVISION • TOLEDO 1, OHIO

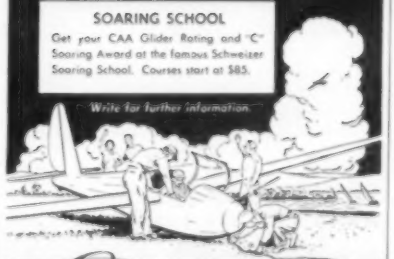
NEW FLYING SPORT

Enjoy the supreme sport of the air – Sky Sailing in a Schweizer Sailplane. Build your own from a low-cost kit, or get one complete, ready to fly. A safe, fascinating sport that increases your knowledge of the air and sharpens your flying skill. Write for free booklet.

SOARING SCHOOL

Get your CAA Glider Rating and "C" Soaring Award at the famous Schweizer Soaring School. Courses start at $85.

Write for further information.



SCHWEIZER AIRCRAFT CORP.

15 AIRPORT ROAD, ELMIRA, NEW YORK

Keep an "ear" on the weather wherever you go with

MOTOROLA WEATHERAMA

New 2-band, hand-size, all-transistor Portable Radio

Get the latest official weather reports for 500 miles around . . . every 30 minutes, every hour of the day . . . over Long-Range Aeronautical Marine Beacon Band. Second Band brings your favorite AM Broadcasts.

Model 6X39 in Grotto Grey and Chrome (less batts.) $79.95

Carrying case, earphone and window mounting bracket optional, extra. Specifications and price subject to change without notice. 90-day guarantee on parts and service.

See it now at your Motorola Dealer

MOTOROLA

World's Largest Exclusive Electronics Manufacturer

(Continued from page 73)

tryside tour of coconut plantations, a visit to the Capitol of Colima, and a ride through near jungle proportions of palm trees. A band met the tour upon arrival at the local airport where we learned that the most aircraft ever seen there before the Idaho arrival, were 12.

Another day at Mazatlan, one of the coast's most beautiful cities, and the tour was at an end. James S. Gabriel, manager of the Hotel Playa Mazatlan, built directly on the beach near the airport, has been a long-time friend of Idaho tour groups and even moved out of his own quarters to ensure every one of our 104 persons had overnight accommodations.

One of the important reasons for long-haul tours is the experience in navigation gained by the pilots participating. All too often an owner never really gets away from familiar terrain due to inhibitions and lack of confidence in his navigational ability. He never fully utilizes the ownership of his aircraft. Many participating pilots who start out unsure and lacking in confidence when reading a WAC map for the first time in a foreign country would back out with the slightest encouragement, but they return home with a sense of security.

Idaho has enjoyed having more than half its private aircraft owners fly an international tour. Every year sees several owners either purchase better aircraft for the purpose of participation or, trade for something roomier and faster after returning home. Dozens of aircraft are tuned up by the local fixed base operators, who never participate but ready themselves should the opportunity present itself. This helps the slow mid-winter period at most airports and peps up pre-spring aviation enthusiasm.

Each year also finds several of the non-flying passengers, who make the trip as guests, returning home firmly resolved to learn to fly. Many are now owners and piloting their own planes.

Long range tours not only fill a need for recreation and navigational training—they also fill a very pertinent training for civil defense. Assembling a large number of aircraft, transporting first aid teams or auxiliary police to coastal cities in times of emergency, would offer no planning or organizational problem to Idaho. The enroute fueling, pattern of flight, feeding and registering as provided by many regularly scheduled air breakfasts, all implement the recreation and pleasure with a practical purpose. END

You are
TOPS in AVIATION
when you get your EDUCATION at
PARKS
COLLEGE OF SAINT LOUIS UNIVERSITY

There's a future waiting for you when you choose Aviation as a career . . . and being a PARKSMAN adds to your prestige.

PARKS offers to you the advantage of a Bachelor of Science degree in 3 years instead of 4 . . . and there is no elimination of subjects. Classes are held for 45 weeks out of the year. Such an accelerated program permits PARKSMEN to start their careers nearly 1 year sooner.

EARN A B.S. DEGREE in Aeronautical Engineering or a BS degree in Aeronautics in Aeronautical Engineering, Maintenance Engineering, Aeronautical Administration.
(Air Force ROTC allows you to complete your education without interruption.)

Non-degree courses available — CAA Approved, A & E Mechanics — 45 weeks covering all phases of aircraft and engines.

Flight courses—Private, Commercial, Instrument, Instructor and Multi-engine Ratings.

All Parks Schooling is Approved for Veterans. Remember too, the PARKS faculty combines the talents of men holding advanced academic degrees as well as experts from the aviation industry.

PARKS offers only the most superior training and because this is a fact . . . enjoys an enviable reputation around the world!

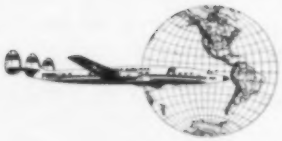
30 YEARS OF AVIATION EDUCATION
PARKS COLLEGE
1927•1957

GET THIS BOOK
Page after page of pictures describe how PARKS students live and learn.
MAIL THE COUPON NOW!

PARKS COLLEGE, HARPER HALL
East St. Louis, Ill.
Please send View Book
I am interested in:
☐ Aeronautical Administration
☐ Aeronautical Engineering
☐ Aircraft Maintenance Engineering
☐ Aeronautical Meteorology
☐ Flight Courses
☐ A & E Course
☐ Information on Public Law 550

Name ..... Age .....
Address ..... Zone .....
City ..... State .....

THE
SKYMOTIVE
STORY
Complete . . . YES
COMPLETE
AIRCRAFT SERVICES
kymotive
O'HARE FIELD CHICAGO



Name your own
7 WONDERS OF THE WORLD
and visit them all
FREE VIA **TWA**
TRANS WORLD AIRLINES
U.S.A. · EUROPE · AFRICA · ASIA

Just list any 7 places, people, or events *in the world* that you would most like to visit and photograph, and you can win this fabulous contest!

TWA-TRANS WORLD AIRLINES will fly you to the 7 world wonders of your choice in luxurious comfort aboard a JETSTREAM* airliner!

AMERICAN EXPRESS will make all arrangements for first class accommodations through its worldwide Travel Service! Your expenses will be covered by safe, convenient, American Express Travelers Cheques, spendable everywhere!

POPULAR PHOTOGRAPHY magazine reveals how you can get aboard this exotic magic carpet . . . with *full details of the most unique contest ever*—in the current issue.

Read complete details in
POPULAR PHOTOGRAPHY
. . . on sale now.

*JETSTREAM IS A SERVICE MARK OWNED EXCLUSIVELY BY TWA

Airport Co-operative

(Continued from page 41)

commercial enterprise.

● A fixed-base operator, the Baker Flying Service, running an approved school including instrument training, charter service and all pertinent facilities including snack-bar and DAMI on the premises.

At this point the average airwise reader might be forgiven a suspicion that Grain Valley Airport must have some pretty big corporate money back of it. But let's look at the record. The 35 owners represent as typical a cross-section of the average American community as could be found anywhere: an insurance sales agent, owner of an auto body repair shop, a lawyer, a telephone company installation supervisor, a housing contractor, a restaurant owner, a brick mason contractor, an ice plant owner, an electrical contractor, a propane gas distributor, an auto mechanic, a railroad engineer, a plumbing contractor, a service station owner, a doctor, an airline flight engineer, a farmer, and a truck fleet operator . . . to name a few. And the types of planes owned are equally typical of general aviation: Cessna 140's, 170's, 172's, 195's; Tri-Pacers; Aircoupes; Apaches; Bonanzas; and a flying club owning a Cub, a Cruiser and a Stinson.

However, although no large corporate financing is evident in the structure of the Grain Valley Airport Co-operative, no one should ever underestimate the ingenuity and financial acumen of the average American businessman. No government aid was forthcoming for this private enterprise—there is not a penny of city, county, state or federal money invested in the property or used in maintenance. So it called for all the self-reliance the membership could muster. But you just can't ground purposeful, imaginative airmen when they set their minds to a project.

For other groups which might like to undertake such a venture, the details of the corporate structure are significant. First a corporation was formed with an authorized capitalization of $15,000, or 30 shares at $500 per share. The quota has since been raised to 50 shares. For his purchase of a share, the member has a vote in the management of the corporation and the prospect of sharing any income from the operation, once all capital improvements have been completed.

In the meantime, the member has the privilege of purchasing a T-hangar at cost, $1,650 (another member, of course, is a builder and provides and finances these T-hangars). A member may use or rent out his hangar (currently $35 a month) to another member who may not be ready to buy. Or he may have the satisfaction of tying down free on the airport which is, after all, his own property. Mathematically, he recovers his investment or its equivalent within a very few years.

An interesting by-law which proves the intent of the corporation to provide a convenience for all its members and not a means of speculation for any one indi-

(Continued on page 76)

ENGINE TIME . . . FLIGHT TIME
at a Glance!

Hobbs AIRCRAFT HOUR METERS
INDICATE TO THE HOUR AND MINUTE

Stop log guesswork . . . know to the hour and minute when check-ups and maintenance are due; the actual time of flights and total hours of your plane. It's automatic with these instruments!

HOBBS ENGINE HOUR METER indicates total engine time; also furnishes the information needed to determine elapsed time between oil change, lubrication, overhaul, etc.

HOBBS FLIGHT HOUR METER with Hobbs Air Switch indicates total flight time . . . and provides the information required to determine actual hours in the air of individual flights. Hobbs Meters are accurate electric timing instruments designed and built for aircraft operation — NOT revolution counters. Weight only 9 oz. . . . no interference with radio reception. Easy to install . . . read at a glance. Low in price . . . fully guaranteed. WRITE:

JOHN W. Hobbs CORPORATION
A DIVISION OF STEWART WARNER
2068 YALE BLVD. SPRINGFIELD, ILLINOIS

BIG or SMALL

they all SHINE BEST
SHINE LONGER
SHINE EASIER with

NEVR-DULL
Aluminum Cleaner and Polish

The original chemically-impregnated cotton wadding — Cleans quicker, gives higher, longer-lasting gloss, leaves protective film. Saves time, labor and money! Avoid inferior imitations.

AVAILABLE AT LEADING DISTRIBUTORS

MANUFACTURED EXCLUSIVELY BY
George BASCH Co.
19 Hanse Avenue, Freeport, L. I., N. Y.

GENUINE NAVY INTERMEDIATE PILOT JACKET

Brand new Genuine dark brown Goatskin leather with zippered front. Bi-swing back, two patch pockets, one inside snap pocket. Mouton fur collar, Celanese lined. 100% wool cuffs and waistband. The finest jacket made.

SIZES
34 to 46
$32.50
48 and 50
$35.00

State Size Wanted

U. S. N. ISSUE

A2 ARMY FLIGHT JACKET, select dark brown goatskin leather, brown rayon lined, zippered, elastic knit waistband and cuffs, 36 to 46, **$19.75,** 48 and 50, **$21.75.**

U. S. AIR FORCE K2A FLYING SUITS, blue nylon, lightweight, 8 zippers, give chest, height and weight measurements. **$10.95.**

U. S. AIR FORCE K2B FLYING SUITS, sage green cotton byrd cloth, latest issue, give chest, height and weight measurements. **$18.25.**

Shipped ppd. if remittance accompanies order.

Distributors of tires, batteries, aircraft parts and equipment

FLYING EQUIPMENT SALES CO.
Dept. F-19
1639-45 W. Wolfram St. Chicago 13, Ill.

TIME TO
SET DOWN

ENTERTAINMENT CITY
On A Pocono Mountain Top

5 Minutes From Field To Fun — Just opening, the only hotel in the East, owned and operated by a fellow pilot. Half-million dollar airport is just five station-wagon minutes away. Three golf courses, indoor pool and outdoor pool. 32 other things to do in the day. Excitement of City-style night life, with dancing, star entertainers, in the Parisian Club. Fly in for vacation. Bring your whole group. New idea for a flying weekend. Telephone 3811 for the station wagon.

high point inn Mt. Pocono, Pa.

ENGINEERING DEGREE IN 27 MONTHS

B.S. Degree. Aero., Chem., Civil, Elec., Mech. & Electronic Engineering. Radio, TV. 36 mo. B.S. degree in Math., Chem., Physics. Prep courses. Demand for grads. Spacious campus. 20 bldgs.; dorms, auditorium, gym. Low rate. Earn board. G.I. appr. Enter Sept., Dec., March, June. Catalog. 1278 E. Washington Blvd., Fort Wayne 2, Indiana.
Keeping pace with progress

INDIANA TECHNICAL COLLEGE

YOU TOO can BUILD a STITS PLAYBOY, Popular high performance, aerobatic sport plane. Easy construction, economical rugged design. New revised simplified blueprints only $25.00. For details with 14 photographs, 3-view and cutaway drawing, and C.A.A. regulations on homebuilt aircraft mail $1.00 to **Stits Aircraft, P. O. Box 3084F, Riverside, California.**

$100,000.00 ACCIDENT INSURANCE
FOR PILOTS AND AIRCRAFT PERSONNEL

Pays up to $100,000.00 for any accident resulting in death or loss of any ONE hand, eye or foot.

CONSIDERABLE SAVINGS OVER OTHER ACCIDENT POLICIES. 24 HOUR PROTECTION IN THE AIR, AT HOME, ON THE ROAD, AT WORK, AROUND THE WORLD.

RATES to AGE 55 *

AMOUNT	NON-PILOTS	PRIVATE PILOTS	COMMERCIAL PILOTS & CREW MEMBERS	MILITARY PILOTS & CREW MEMBERS
$100,000	$150.00	$525.00	$600.00	$675.00
50,000	75.00	262.50	300.00	337.50
25,000	37.50	131.25	150.00	168.75
15,000	22.50	78.75	90.00	101.25
10,000	.....	52.50	60.00	67.50

*** RATES FOR 56-80 UPON REQUEST—*MAIL COUPON NOW!***

PROFESSIONAL ASSOCIATES, ADMINISTRATORS
PILOT & AIRCRAFT PERSONNEL ACCIDENT INS.
SUITE 856, 120 SOUTH LA SALLE STREET, CHICAGO 3, ILLINOIS

Please rush full information and application to:

NAME .....

ADDRESS .....

CITY & STATE.....

(Continued from page 75)

vidual, restricts ownership to two shares above the number owned by the smallest shareholder. Thus two shares is the maximum differential. No one can own four shares until all hold at least two. Furthermore a shareholder may own only one hangar per share held, so there can be no cornering of the hangar market.

One of the secrets of success in any co-operative undertaking, of course, is the esprit de corps engendered by the very nature of the enterprise . . . everyone working together for the common good. Much of the work around the airport is done by work parties of members—volunteers to mow grass, clean up, patch the roof, fill holes, improve or repair the shop hangar, lobby, and other facilities. Pride of ownership and devotion to a common cause—the promotion and advancement of private flying—have welded a friendly group of pilots into a sound business organization.

The result—Grain Valley Airport—is listed in the Airport Directory, and the welcome mat is out and the Unicom on for any and all who wish to use the field. END

"I shouldn't have taken this Limburger sandwich!"

When the Chips Are Down

(Continued from page 48)

equipment, check his own position but must depend on the ground operator. The accuracy of the method depends almost entirely on the skill of the controller. And last, but not least, is the time lag between the observed deviation of the flight path on the radar scope and the execution of the correction as received by the pilot.

Now for ILS. This is essentially a localizer, glide slope projector and a middle and outer marker beacon. The localizer course of the ILS provides lateral guidance while the glide slope indicates vertical guidance. The glide slope projector angle is normally adjusted at two to four degrees above the horizontal so that it intersects the middle and outer marker beacons at about 200 to 1,100 feet, respectively. These radio emissions actuate an instrument on the panel of the aircraft in the form of a cross, with a blue sector on the right and a yellow sector on the left. As long as the vertical and horizontal bars of this cross are centered, the aircraft flies on the exact approach path to the runway.

Principal advantages of this system are that it is fully automatic. It requires no human operators on the ground and it can be monitored both from the aircraft and from the ground for malfunctioning. It gives the pilot instantaneous information of his whereabouts so that he can make his corrections without delay.

Drawbacks are that it requires an orientation problem unless the approach to the airport is perchance on the same heading as the final approach heading to the runway. Otherwise the airplane must first overhead the outer marker beacon, then reverse its course, fly the outbound heading for a minute or so and reverse course again. This usually takes about four to five minutes.

It is obvious that the ideal solution is a combination of the two systems and, in reality, a first-class airport is equipped with both systems. But what will it be for the final approach: a GCA talkdown with ILS check, or an ILS approach with a GCA monitor? There is quite a difference as we will shortly see. Let us go through a typical approach and you can judge for yourself.

We arrive at the gateway radio beacon at some designated altitude and are advised that the visibility is two-tenths of a mile with sky obscured (no definite cloud base). Thus we know that conditions are well below official minimum but we elect to take a "look-see." We know that when we make visual contact with the ground, we should be exactly aligned with the runway, as any but the slightest of turns is not feasible at a low altitude. Now we are turned over to the GCA controller and guided into the final approach heading of the runway.

What is little realized by those who do not actually fly airplanes, but what pilots are acutely aware of, is that, at the very moment when we approach the glide path and commence descent, we must, at that

CAA EXAM AIDS

JUST REVISED! INCLUDES NEW OPEN BOOK EXAMS NAVIGATION AND METEOROLOGY MAPS INCLUDED FREE!

A Ross Questionnaire FOR EVERY CAA RATING

Only $5.00 EACH

The EXAMS in Ross Questionnaires are typical of the very latest CAA questions. We are constantly revising our books to assure your receiving the very latest material. Use Ross Questionnaires to prepare for your CAA ratings and you'll save time, effort and money. Order today on our money back Guarantee. Tear out and mail coupon below, now!

CUT OUT AND MAIL

☐ Payment enclosed. Ship postpaid. ☐ Send C.O.D.

☐ Private Pilot $5.00
☐ Commercial Pilot $5.00
☐ Instrument Pilot $5.00
☐ Airline Trans. Pilot $5.00
☐ Flight Instructors $5.00
☐ Engine Mechanic $5.00
☐ Aircraft Mechanic $5.00
☐ Flight Engineering $5.00
☐ Ground Instructor $5.00
☐ Control Tower Op. $5.00
☐ C.A.R. for Pilots .. $ .50
☐ Parachute Rigger $5.00

NAME _____
STREET _____
CITY _____ STATE _____

SPECIAL NOTICE!
Would you like a complete Ross Aviation Library, consisting of all 12 Ross Aeronautical Questionnaires shown here? If so, we offer the complete set at a special price of — $15.00
☐ Check here for this 12 book special offer.

ROSS AERO PUBLISHERS
BOX 8098-K • MUNICIPAL AIRPORT • TULSA, OKLAHOMA

INSTRUMENT RATINGS

IN A HURRY! BIG PAYING JOBS NOW OPEN FOR YOU!

TRAIN IN 26 AIRPLANES—12 FLIGHT SIMULATORS

There are many big paying jobs in aviation today, waiting for you . . . if you can qualify! Improve your ability and advance with additional training you can get at Ross Aviation. Personalized instruction can get you those CAA ratings immediately and those high paying jobs can be yours! Let us know today what courses you would like and we'll advise you in detail by return mail, how Ross Aviation can help you . . . help you to make more money! Ross Aviation is nationally recognized as the largest supplier of trained pilots to the airline companies of the nation.

LOOK AT WHAT ROSS AVIATION OFFERS YOU:

- Largest flight school in the U.S.
- Centrally located, good weather all year.
- Free placement service.
- Largest supplier of pilots to the nations airlines.
- Only flight school in U. S. using fully automatic link trainers.
- Ground school and Flight school.
- Operates seven days a week.
- CAA examiners on staff.
- VA and CAA approved.
- Courses start every Monday, no waiting.

CAA EXAMINERS ON STAFF

ROSS SCHOOL OF AVIATION
TULSA, OKLA. • PHILA., PA.

MAIL TODAY!
ROSS SCHOOL OF AVIATION
Box 8098-B, Municipal Airport, Tulsa, Oklahoma
You bet I'm interested. Without obligation, please send me FREE information on the courses checked.

☐ Instrument
☐ Airline Transport
☐ Multi-Engine
☐ Flight Engineer
☐ Commercial
☐ Flight Instructor
☐ Link Instructor
☐ A & E Mechanic

Name _____ Age _____
Your hours logged _____
Address _____
City _____ Zone ____ State _____

CESSNA 170-172 Owners

NOW YOUR FLYING CAN BE FASTER AND SAFER

STEPS UP SPEED
CRUISING SPEED increased to 147 mph at 6000 feet using 75 per cent power

SHORTER TAKE OFFS
TAKE-OFF RUN shortened by 25 per cent

GREATER CLIMB OUT
RATE OF CLIMB increased to more than 1000 ft/min

DOYN CONVERSION

The Doyn Conversion offers Cessna 170 A & B and 172 owners a complete package for increased performance, including a 170 horsepower Lycoming O-340-A1A engine, Hartzell constant speed propeller with governor, 35 ampere-hour battery, Harrison oil cooler, cross-over exhausts and extra large muffler with single exhaust stack. The welded tubular steel engine mount exceeds CAA static requirements by 55 per cent.

SEND FOR FREE BOOKLET

DOYN AIRCRAFT

BOX 3035 SOUTHEAST STATION WICHITA, KANSAS

BATORI COMPUTERS

All metal precision instruments for all dead reckoning navigation. With accuracy and simplicity of operation not available in any other computer of its type.

Indicates in fixed windows ground speed, fuel consumption and drift unmistakably. Solves all wind problems without plotting, without limitation in air speed, wind speed and drift.

One moving part only, requiring one setting only.

Not affected by climatic conditions. Lasts indefinitely.

Standard Type for Propeller Aircraft:
TYPE B-23, pocket size, 4" diameter; TYPE B-24, shirt-pocket size, 3" diameter. The smallest precise and clearly readable computer in existence.

Supersonic Type for Jet Aircraft:
TYPE B-26, SPEED RANGE MACH NO. 2
Two sizes: pocket size, 4" diameter; shirt-pocket size, 3" diameter.

STANDARD TYPE B-23

Price $15 each

Including instruction booklet and leather carrying case

BATORI PLOTTERS FOR ALL CHART WORK

- Clearly transparent, precision engraved, beveled edges, 1/16" thick.
- Unambiguous course indication.
- Replaces parallel ruler and protractor.

Batori Mark I Scale in Statute Miles
For SEC and WAC charts
Size 11.6"x4.3".....Price: $5.00

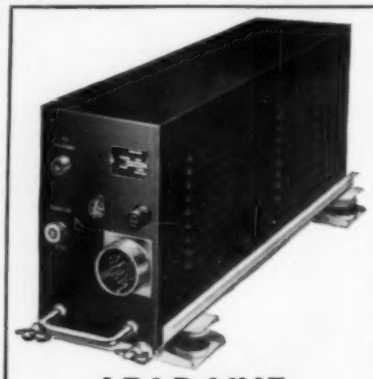
Batori Mark I Scale in Nautical Miles
For SEC and WAC charts
Size 11.1"x3.8".....Price: $5.00

Batori Mark II Pocket Size, Scale in Nautical Miles
For WAC and ROUTE charts
Size 7.2"x3.6".....Price: $3.00

Complete with instruction leaflet

BATORI COMPUTER COMPANY, Inc.

551 Fifth Avenue
New York 17, N. Y.



LEAR VHF
36 Channel
TRANSMITTER-RECEIVER

Remote Crystal Controlled
CAA APPROVED

A POWERFUL PACKAGE FOR EXECUTIVE TYPE AIRCRAFT

19⅝" x 5" x 7¾"

Under 20 lbs.

14 or 28 volt operation
4 watt 36 channel transmitter

100% modulated, with 2½ watt power amplifier for cockpit speaker. Automatic channel selector establishes transmission and reception on same frequency. No 'long counts' necessary while tuning in stations. Selection is made by the remote control unit which is of conventional design and is electrically illuminated for good visibility with optional red or white light.

Complete LVTR-36 including Airline Type Antenna

$995

(specify voltage)

write—wire—phone

The Air-Oasis Co.

2601 E. Spring St.
Long Beach 6, Calif.

GArfield 7-0901 NEvada 6-0365

(Continued from page 77)

very instant, place the aircraft in landing configuration. This means, lower the landing gear, lower the wing flaps, increase the propeller revolutions, decrease the power on the engines, adjust the cowl flaps, check the hydraulic pressure, check the gear and brakes, perhaps turn on windshield wipers and landing lights. All this while the controller feeds his corrections to us. While still some distance out, he specifically instructs us that, in case we lose contact with his voice for five seconds, we must consider the approach unsatisfactory and instigate our missed-approach procedure.

All operators have been taught to speak in a soothing tone of voice and to use expressions to inspire confidence and alleviate tenseness on the part of the pilot. Thus, we never approach the localizer course, we approach "nicely," although I am often aware that I am not approaching the course nicely at all but so abruptly that I fly right through it—nevertheless we always make our corrections "nicely."

It has been proven time and again that even pilots can do only one thing at a time. It can be seen that, for the first part of the descent, something has to suffer. Either the instructions will get little attention, or we fail to check properly all the items just mentioned. From this time on until the plane lands, we receive continuous advice. Once in a while we steal a glance at the ILS indicator to see how well it checks with the GCA, but more than a glance we hardly have time for, because to give the controller his due, we must explicitly carry out his corrections. How well we are lined up with the runway and at the correct height above it depends almost exclusively on how well the controller can interpret the progress of the little dot on his scope and how well he can anticipate the pilot's corrections. It takes more than six seconds for the corrections at the aircraft's controls to take effect and still more for the new change of attitude to make itself felt. Unless the aircraft has established itself steady on the approach for the last mile, it will most likely drift off at the last moment and, unless we are exactly lined up, the chances for a landing under very low visibility and ceiling are very much lessened.

Now for the other side of the picture. Again, under GCA control, we have rolled into the final approach heading. When it is time for descent, we observe the glide path bar of our instrument which has been at the top, slowly coming down and we know that in a few seconds we will be on the glide path. As the bar approaches the horizontal, we prepare the aircraft for landing, meanwhile keeping our cross pointer centered. Every now and then the GCA voice comes through, telling us if we are left or to the right, or high or low, and how far we still have to go to the runway threshold. Everything is quiet and peaceful. A slight deviation of our indicator bars calls for an immediate correction.

At minimum altitude the most impor-

Do-It-Yourself PLASTIC LAMINATING

CARDS | LICENSES | PAPERS — $1.00

New, instant laminating plastic sheets will permanently preserve your important cards and papers. PLAIN-VU is 100% transparent; guaranteed not to discolor, harden or deteriorate. No machines, heat or glue is required. Fascinating new process cuts laminating costs as much as 75%.

IDEAL FOR PHOTOS

Favorite snapshots, clippings, ID's will never crack, tear, or wrinkle embedded in crystal clear PLAIN-VU.

ORDER NOW

Jr Kit—10 sheets (3"x4") only $1 postpaid. Jumbo Introductory Kit—10 sheets 3"x4", 6 sheets 6"x8", 2 sheets 10"x12" only $4.50 postpaid. Satisfaction guaranteed—from

NATCO CO., Dept. F-2, Alfred, Maine

SEA AND SKY PORTEL

A unique vacation facility for travellers of sky, sea and highway. 3500 foot surfaced runway, 30 boat luxury marina and spacious efficiency units on Lake Montauk, Montauk Point, New York.

Inquire P. O. Box 738
Montauk, L. I., N. Y.

See page 89

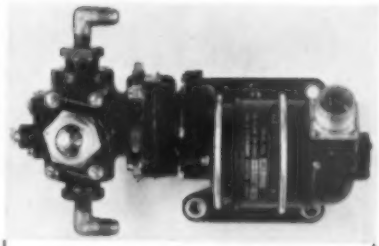
tant duty of the second pilot is to look sharply ahead for the powerful approach lights while the captain keeps his eyes glued on the instruments. Suddenly we hear, "I see the lights!"

We look up and outside and see below and ahead of us two rows of high-intensity lights. We now make the transition from instrument to visual flight. This is often a most peculiar sensation because the lights do not appear at all as one would expect them to be. What they look like I cannot rightly tell, but from experience one learns just what his position is while the lights flash by. From the approach lights, we pass over the threshold green and the runway white lights and soon we are rolling along the runway to a stop.

The approach to a busy airport under low visibility conditions is an ever-increasing babel of voices, instructions, checks and directions, culminating in the continuous final talk-down. Only those who have made hundreds of these approaches know how to relax and carry it off without undue strain and tension.

I firmly believe that, when the chips are down, when we want to be sure we approach the runway exactly where we want to be—the most accurate, the most safe procedure, is the ILS approach with GCA monitoring. This gives us the advantages of both systems, while it puts the ultimate responsibility squarely on the shoulders of the pilot, where it rightly belongs.

END



BONANZA OWNERS

Our electric auxiliary fuel pump, CAA approved for all Bonanzas starting with serial No. 1117, offers

- **FULLY AUTOMATIC STARTING, NO MORE HAND WOBBLING**
- **ADDED SAFETY OF DUAL FUEL PUMPS DURING TAKE-OFFS AND LANDINGS**
- **INSTANTANEOUS FUEL PRESSURE IN EMERGENCIES**

Only $160.00 complete with installation kit, and we guarantee each pump for 6 months!

GLUCKMANN AVIATION COMPANY
61 Lick Place, San Francisco 4, Calif.
Phone Yukon 6-5251

PILOTS — INCREASE YOUR EARNING POWER

Get Your INSTRUMENT and AIRLINE TRANSPORT RATING *NOW*

INSTRUMENT
An Instrument Rating is a MUST for all AIRLINE co-pilots, business pilots and for any one making extended cross country flights.

COMMERCIAL PILOTS COURSE
Present tremendous demand for airline pilots has depleted supply of qualified commercial pilots — if you want to fly for a living get your Commercial NOW.

AIRLINE TRANSPORT
Necessary for all airline captains — most private companies now require it for all their pilots. Single engine and multi-engine Lockheed, Aero Commander, Douglas DC-3's available.

TYPE RATING
Available to those already holding ATR's who want a Type Rating added to their license. Lockheed, Aero Commander and Douglas DC-3's available.

COMPANY PILOT REFRESHER
Single engine and Multi-engine Lockheed, Aero Commander and Douglas DC-3 aircraft available for this Course, which is tailor made for each company pilot.

MULTI-ENGINE
Lockheed, Aero Commander and Douglas DC-3's available for this course.

INSTRUCTOR
Tremendous demand for pilots holding Instructor Ratings.

A Complete Ground School Furnished With All Courses.

Train at American Flyers — the world's largest Instrument and Airline Transport Flying School — and insure your future in aviation. American Flyers has trained more pilots for the airlines than any other school in the country — MORE THAN ALL OTHER SCHOOLS COMBINED!

VETERANS — All you need to enroll in any of these courses is a Certificate of Eligibility from the Veterans Administration approving you for the courses you desire. Courses start every Monday morning — no waiting.

"THE AIRLINE PILOTS TRAINING SCHOOL"

AMERICAN FLYERS INCORPORATED

MEACHAM FIELD • FORT WORTH 6, TEXAS

MAIL THIS COUPON TODAY

☐ INSTRUMENT
☐ AIRLINE TRANSPORT
☐ COMMERCIAL
☐ TYPE RATING
☐ COMPANY PILOT
☐ MULTI-ENGINE
☐ INSTRUCTOR

☐ VETERAN ☐ CIVILIAN

REED PIGMAN, AMERICAN FLYERS,
Meacham Field, Fort Worth 6, Texas

Please send me FREE Booklet and data on courses checked —

NAME_____

STREET_____

CITY_____ STATE_____

IN NEW YORK

Touch Down

AT

ZAHNS AIRPORT

AMITYVILLE, LONG ISLAND

Serving Greater New York

Hard surface runways 4200 ▪ Unicom Teletype ▪ Direct line to ATC and INSAC ▪ Instrument approach ADF ▪ Runway lighted all night ▪ Rotating beacon ▪ Motel

Air Taxi • Charter flights
Hertz rental cars

Gov't. approved
Airplane and Helicopter flying school

Sales • Service • Storage

Tel.: Amityville 4-4200

Airplanes Wanted

WE WILL SPEND $450,000 CASH EACH SIXTY DAYS FOR CLEAN AIRPLANES

In our inventory for immediate sale or trade we have:

$78,600.00 Executive Lockheed Lodestar—Serial No. 2190—red and blue trim, white fuselage top—complete dual instrumentation—prop, carburetor and windshield alcohol anti-icing—24 volt system—plush executive interior—galley—lavatory—radio includes ARC R15 receiver—ARC CD1 course director with CA-10 computer—dual R-5/ARN-7 Bendix ADF—R89 ARN5A glide slope receiver—DTR 360A transceiver—Collins 17K1 transmitter—R8 ARN marker beacon receiver—BC733D localizer receiver—ARC F11 150 amp. isolation amplifier—Hamilton standard 23E50-471 props—1820-56 Wright engines with 469 and 222 hours since overhaul—3259 hours total airframe—just relicensed to March, 1959—also includes two spare engines, one zero time since overhaul and one run out—flown only by a professional pilot.

$64,700.00 Lockheed Lodestar—Serial No. 2039—N46F—has brand new CAA periodic—flown 285 hours during last two years—engines: Wright Model 18-20-202A's and have 285 hours since complete major overhaul—24V system—painted grey, white and blue in Learstar design—prop and windshield alcohol—dual Collins 360 channel 51R Omni's—very neat and complete dual instrumentation—dual Bendix ADF's—Collins 17L3 transmitter—Lear LVTR-36 standby transceiver—Bendix MN53A 3-light marker beacon receiver—dual R89B 10-channel glide slope receivers—isolation amplifier—useful load 5405 lbs.

We urgently need to reduce our inventory and would like to trade one or both of these Lodestars on D-18's—Aero Commanders—310's—or Twin Bonanzas.

Send Name and Address to Receive our Mailing List

BEECHCRAFT DISTRIBUTORS

JACK ADAMS AIRCRAFT SALES, INC.
TWINKLE TOWN AIRPORT
P. O. Box 5446 Memphis 16, Tenn.
Phones EX 1-4436,
EXpress 1-4437, EXpress 1-4438

I Learned About Flying from That!

(Continued from page 50)

behind and far enough to his right so he could see me, hoping for a wave-on. None came and inwardly I swore. It's a toss-up as to which was the noisest at this moment, my gnashing teeth or the roar of the engine.

I now had plenty of time to make a thorough second check of all the dials and gauges, but in my state of mind I had room for little else than thoughts of mayhem for the student sweetly oblivious of me huffing and puffing on his tail. Finally he took off. And, ages later, or so it seemed, his trainer cleared the edge of the field. I immediately released carburetor heat and poured on the coal.

Because the evening was hot and I was heavily loaded, I let the ship roll longer than usual. It broke cleanly and the airspeed was indicating 75 as I passed midfield and horsed back gently on the wheel. A few seconds later, as I neared the edge of the field, I had 75 feet and was climbing gently when, without warning, the engine sputtered!

My heart leaped, for I was past the point of sitting down. The engine picked up immediately and I hoped it was merely a speck of dirt or drop of moisture. However, I instinctively inched the wheel forward, increasing my airspeed to 80—just in case. At 300 feet, and without any additional warning, the engine quit cold. One moment it was running full blast; next moment the prop was windmilling.

Like all pilots, I've given a great deal of thought to what I'd do under such circumstances. The moment had now arrived, under the worst possible circumstances. I had a loaded airplane, 300 feet of altitude, the air was hot and thin, and there was no wind. Moreover, the area below me was well populated and uninviting. A 180-degree turn was out of the question. Better to fly into a brick wall than risk a turn at this altitude.

Acting on reflex, I did three things. I pushed the wheel forward to maintain flying speed; reached down and switched the fuel selector valve from the right to the left tank, and scanned the ground below for a place—anyplace—to get down with a whole skin. There was a small field off to the southeast. It was within gliding range, but short. At best, the airplane would fare badly. And then a wonderful thing happened! The engine coughed. I jockeyed the throttle frantically and the engine caught with a roar. It was the sweetest music I ever heard.

I immediately went into a gentle left turn and seconds later slid across the tree tops onto the nearest available runway. It was crosswind but I didn't care. I breathed a prayer of gratitude as I slowly taxied toward the hangar.

My thoughts turned to the reason for the engine malfunction. It was operating normally now. All thoughts of my former haste, incidentally, were completely forgotten as I pulled up before a little knot of spectators. Milt came up and said: "What went wrong?"

Another chap was less restrained. "Holy Smokes!" he exclaimed, "when you

Service & Maintenance

Flight Instruction

80 - 91 - 100 Octane

• Unicom • Rotating Beacon

• Hard Surface Runway

• Lights on Request

• Snack Bar • Hertz-Rent-A-Car

• Charter Service

Midway between Washington and Richmond

— Out of congested area —

SHANNON AIRPORT

P. O. Box 354 Fredricksburg, Va.

Phone Essex 3-4431

AIRPLANES WANTED

FOR IMMEDIATE CASH

Highest prices paid for clean used aircraft—Twins and Single Engines—all categories wanted. Write, Wire or Phone ALL details for immediate cash offer. No delay.

World's Busiest Aircraft Dealer

GRAUBART AVIATION, INC.
540 N. Lake Shore Dr., Chicago 11, Ill.
Telephone MOhawk 4-6260

SMOKE MY NEW PIPE 30 DAYS AT MY RISK

New principle that contradicts every idea you've ever had about pipe smoking. **I guarantee it** to smoke cool and mild hour after hour, day after day, without rest, without bite, bitterness or sludge. To prove it, I'LL LEND YOU a new CAREY PIPE. Send name today for my FREE complete TRIAL OFFER. Write: **E. A. CAREY, 1920 Sunnyside Ave., Dept. 115-S Chicago 40, Illinois**

***Ideal Gift For* THE MAN IN AVIATION**

Miniature WHIRLWIND ENGINE Cuff Links and Tie Bar

Only $6.50 *per set, tax included*

Delight the man who has everything, with a Precision Molded Replica of a famous radial aircraft engine and propeller.

NON-TARNISHING RHODIUM (SILVER) FINISH

The Varsity Shop
6319 Hillcrest
Dallas 5, Texas

Ship post paid ____ Sets
$____

NAME____

ADDRESS____

CITY____ ZONE____ STATE____

(Enclosed Cash____ Check____ Money Order____)

Frank South LUGGAGE

TWO NEW EXCLUSIVE BAGS

(Available nowhere else)

MY NEW IMPROVED DESIGN

AT A NEW, LOW PRICE!

No. 555

Will hold shape. Handle straps fold down out of way—Lower straps saddle stitched and reinforced with heavy brass studs. 4 sides of top reinforced by heavy steel bars to prevent collapsing or popping out of ends—6 oz. top-grain cowhide leather—natural color, smooth leather finish inside—2 full length partitions with neatly bound edges—adjustable brass lock with key—Black only.

16"x11½"x7" New Low Price **$16.90** | 18"x12½"x7½" New Low Price.. **$17.90**

Prices Plus 10% Excise Tax. $1. Shipping

IMPROVED PILOT'S FAVORITE

Brass draw-bolt type locks with key—very strong and durable. 4 sides of top reinforced for extra strength by heavy steel bars to prevent collapsing—Natural color, smooth leather finish inside—6 oz. top-grain cowhide leather—two full length partitions with edges neatly bound—Colors Black and Ginger—

No. 999

16"x11½"x7" New Low Price **$18.90** | 18"x12½"x7½" New Low Price.. **$19.90**

Prices Plus 10% Excise Tax. $1. Shipping

ALSO FULL LINE of Brief Bags and Cases

The mail order man who saves you money

AT-4-8383 **FRANK SOUTH** No C.O.D.

P. O. BOX 13366 FORT WORTH 18, TEXAS, DEPT. F

BUILD a SKYHOPPER PLANS $50.00 Money Back Offer!

Clear, simplified and easy to read drawings. All ribs and fittings are drawn full size and may be used directly as templates in making parts. 260 sq. ft. of drawings supplied. Planes eligible for CAA license. SPECIAL OFFER . . . Inboard and 3-View Drawing . . . **$2.00.**

SALVAY STARK AIRCRAFT CO.

8296 POPPY WAY BUENA PARK, CALIF.

SURVIVAL KITS

C.A.P. SPECIAL

This kit has been developed for the CAP Pilot, who often must walk considerable distances from his plane when on rescue duty.

It is a "Chest-Kit," attached to the pilot and with him wherever he goes.

CAP Pilots—write for particulars, state group you belong to and license number.

The Survival Equipment Company

Division of Victor Tool Co.

Dept. 617 Oley, Pennsylvania

AEROCAR "Flying Automobiles"

Now CAA approved up to

2100# Gross Weight

PRICE $15,000 F.A.F.

Write for Brochure

on your Company Letterhead

AEROCAR, Inc.

Longview, Washington

dropped below those trees we thought you'd had it."

"Turn off the engine and I'll have a look," Milt suggested.

In a few minutes he reported. "She's getting gas all right. Start her up once more and let's see what happens."

I complied. The engine ran smoothly. At full throttle the tach indicated a normal 2,200 rpm.

Milt walked around and asked: "Say, how's your gas?"

"Both tanks full," I retorted promptly. Then, to further reassure myself on that score, I glanced to my right at the fuel gauge overhead. To my horror and astonishment I saw the needle resting squarely on zero. It required several moments for this stark, unbelievable fact to register. I was incredulous. It just wasn't possible that I had taken off on an empty tank. But that was exactly what I had done. It explained the engine misses on take-off. As I lifted the nose, the gravity feed had been momentarily cut off from the near empty tank. The engine had resumed when I depressed the nose and flattened my climb. Now, with a rush, I recalled that the previous week end I had arrived late and found a friend impatiently awaiting me. I had departed from my usual habit of filling the tanks before putting the ship away.

This is a story with a happy ending despite some very serious mistakes. Happily I didn't pay the penalty for my carelessness. I was embarrassed, and how! But unhurt.

In a nutshell I'd gone through the motions of a pre-flight check, which is no better than none at all. My haste had blinded me to the fact that the gas gauge pointer needle, on my model Cessna, is separated only a fraction of an inch when the tank is either full or empty.

Now, come Hell or High Water, I slow down when I reach the airport. I never run. I walk. And you'd be surprised how patiently I wait for the other fellow to complete his run-up before take-off. END

STALLS IN TURNS

FLIGHT Safety Foundation Bulletin warns pilots to be aware of variation in stalling speed which occurs with different angles of bank in a turn. Though increase in stalling speed at shallow angles of bank in a properly coordinated turn is small (3 per cent in a 20-degree banked turn), it goes up rapidly as the turn is steepened (to 41 per cent in a 60-degree bank and 71 per cent in a 70-degree bank). The airspeed indicator tends to be optimistic, indicating a higher air speed in turn just as it does in level flight. In turns, therefore, one should not only be aware of higher stalling speed but also be sure to maintain an adequate margin of IAS above the stall. Thus if the stalling speed is 50 mph in straight flight, in a 60-degree turn it will be 70 mph; a good margin should be added to that.

Jet Airliners AND YOU!

Now is the time to prepare for the many career opportunities coming with THE AGE OF JET TRANSPORTATION!

Trained A & E (Aircraft and Engine) Technicians will soon be needed in ever increasing numbers to maintain and service the great new fleets of Boeing 707's, Lockheed Electra's, Douglas DC-8's, Convair 880's and British Viscounts now on order for the airlines.

NORTHROP INSTITUTE PREPARES YOU

Now is the time! Enroll for Northrop's 50 week course in A & E Mechanics. No time is lost on non-essentials. Northrop grads readily obtain their AIRFRAME & POWERPLANT CERTIFICATE, issued by the Civil Aeronautics Administration. The demand from employers for Northrop graduates often exceeds the supply of men available.

ADVANCED JET COURSE

After completing the A & E Course, you can enroll for Northrop's Jet specialization study. Requires only 12 weeks to complete.

EMPLOYMENT ASSISTANCE DURING SCHOOL AND AFTER GRADUATION

Permanent free placement service to all graduates. This department also makes every effort to assist students in finding part-time employment if they request help.

CHOOSE THE HOURS WHICH ARE MOST CONVENIENT FOR YOU—

Shift One—7:45 a.m. to 3:15 p.m.

Shift Two—4:30 p.m. to 12:00 p.m.

Approved for Veterans

Northrop

Aeronautical Institute

1119 W. Arbor Vitae Street

Inglewood 1, California

Mail Coupon for Free Catalog

NORTHROP AERONAUTICAL INSTITUTE

1119 W. Arbor Vitae Street, Inglewood 1, Calif.

Please send me immediately the Northrop catalog, employment data, and schedule of class starting dates. I am interested in:

- ☐ Master Aircraft and Engine Mechanic
- ☐ Jet Engine Overhaul and Maintenance
- ☐ Aeronautical Engineering Technology
- ☐ Electronic Engineering Technology
- ☐ Aircraft Maintenance Engineering Technology

Name..... Age...

Address.....

City..... Zone... State.....

Veterans: Check here ☐ for Special Veteran Training information.

Airtex Products
MAKES
EVERYTHING
IN TEXTILES
FOR Your PLANE!

AIRTEX FOAM SEAT CUSHIONS

Now you can have real comfort with Airtex replacement cushion sets. No more shabby upholstery! No more sore backs! Available for practically all makes and models of aircraft. Durable molded foam rubber cushions, beautifully upholstered in a wide selection of colors and materials. Map pockets on all front seat backs! Guaranteed to be superior to the original cushions. Designed for easy installation which requires absolutely no upholstering experience. These cushion sets are not throw cushions -they are designed to completely replace your old cushioning and upholstery. Available in regular, heavy duty and de luxe models. Write for fabric swatches. Mention make and model of your plane.

HEADLINERS

Does your present headliner match the airworthiness of your plane?Install an Airtex headliner and make your cabin interior clean and modern. Our new stainless oyster white plastic coated perforated headliner fabric, so popular in new planes, is now available in models for most makes of older aircraft. Ask us for headliner material samples, including our regular line of napped colored fabrics. Airtex Headliners are easily installed - no experience required. All zippers,attaching flaps and other fittings are already sewed in, just like the original. Installation instructions supplied.

SIDE WALL PANEL SETS

Brighten and beautify your cabin walls with an Airtex replacement wall panel set.Colorful leatherette, trimmed with carpet kick panels mounted on durable fiberboard,ready to attach. The set includes door panels. Available in colors and materials to match your new Airtex cushion set and carpet set! Models for many popular makes of planes.

CARPETS

Comfort, beauty and noise reduction will be yours with a new Airtex fitted carpet set! Cleaner, too! Dirt won't sift into the fuselage; just unsnap the carpet and shake it out! Beautiful colors in deep pile, high quality woven carpet material. Cut to fit around pedals, seats, etc. Snaps included. Samples on request. Models for most planes.

GRADE "A" COTTON — FLIGHTEX FABRIC — IRISH LINEN

RE-COVER ENVELOPES

When your plane needs re-covering, get the best - Airtex Grade A Cotton or Irish Linen envelopes made from Flightex fabric which far exceeds TSO minimums.

All envelopes are made from full-piece wide goods so that seams are kept to a minimum. Each pattern is carefully designed to leave a minimum of finishing operations. All patterns have been checked for accuracy during actual installations in the field. This assures you of a perfect fit with every Airtex re-cover envelope. All seams are turned and double stitched.

Did you know you can save hundreds of dollars by re-covering your own plane under supervision of a local A & E? (See CAM-18-10a) Our free instruction manual tells how. Airtex carries all materials,supplies and dope for re-covering aircraft. Twenty gallons or more of dope or thinner shipped free anywhere in U.S. Write us for more information.

PROTECTIVE COVERS

Heat reflective windshield covers, engine and propeller covers available for popular planes.

AIRTEX HAS EVERYTHING!

Write for FREE CATALOG

Airtex Products
20-22 Union Street Morrisville, Penna.
CYpress 5-3462

Pre-planning for the Jet Age

(Continued from page 31)

"no" column on the chart. Also, there is no audio in the loop position, so another "no" is checked. When you note that the tuning meter does not vary when loop is rotated, a third "no" is added. The problem now is how to report this information to the ground in language that maintenance personnel will easily understand. Because the airways are crowded, any message of this type must be short and direct. For this reason, a simple code was devised.

Let's assign Code 1 to Chart 1; then insert "no's" in the blocks where we found troubles with the loop in the above analysis (blocks II-A, II-C, and III-B). The pilot will then send the following message to the ground crews: Code 1; II-A, II-C, III-B. The ground crewmen, armed with the same type of chart, will check the chart as given by the code. Then it is simply a matter of analyzing the chart, determining which component is faulty, and having a replacement part ready for installation when the airplane lands.

If the maintenance man who may make this component change is not an electrical or electronic technician, his knowledge is somewhat limited in analyzing the chart. Each item on a supplemental chart, which we call the trouble-shooting analysis chart (see Chart 2), corresponds to an item on Chart 1. By checking the "no" answers on Chart 1 and reading the corresponding items on Chart 2, the maintenance crewman can determine the trouble and provide the recommended fix.

To determine the feasibility of this procedure, we disabled part of the ADF system in one of our production airplanes and asked our flight crewmen to check out the system, using Chart 1. They were able to complete their check and determine what was wrong in only four minutes. Ground personnel analyzed the chart and had a replacement ready for the disabled ADF when the airplane landed.

This then is a sample of the kind of forethinking that must precede the advent of jet air transportation. Even this one step will require cooperation to a vast extent, practical as it may be and with great economic advantages. It is just one example but perhaps it will serve to show that the coming of the jets is no mere exercise in changing airline equipment but a great scientific and economic equation challenging the aircraft industry and the airlines alike to think ahead of their problems. It is an exciting era in which to be working in aviation. END

SAFETY BELTS

Check the safety belt in your plane. It should have the TSO (Technical Standard Order) label of CAA. All others do not meet minimum strength requirements and should be replaced, including the obsolete TC type.

END PLANE UPKEEP

COVER YOUR PLANE WITH HERTER'S CHROME FIBERGLAS
C. A. A. approved

OR LET OUR CUSTOM PLANE COVERING PLANT DO IT FOR YOU.

- GUARANTEED FOR THE LIFE OF THE PLANE.
- WILL NOT ROT, NOR WEATHER.
- 5 TIMES THE STRENGTH OF STEEL YET LIGHT IN WEIGHT. INCREASES PLANE SPEED. DOES NOT SHORTEN STALL OUT.
- UNAFFECTED BY HAIL, SALT WATER OR SALT AIR
- ELIMINATES NECESSITY OF HANGARING
- GIVES YOUR PLANE A SKIN FAR SUPERIOR TO ALUMINUM OR FABRIC.
- COST IS LESS THAN ORDINARY FABRIC JOB.

WRITE TODAY FOR BOOKLET WITH FULL DETAILS. DEPT. 4-8-G

HERTER'S AIRCRAFT DIVISION
WASECA, MINNESOTA

THIS CENTENNIAL YEAR
FLY TO MINNESOTA'S
OTIS LODGE

An American plan resort recommended by Duncan Hines. Fishing trips with guides a specialty. Golf Course with bent greens, individual cottages beautifully located on the shores of lake Sisse-bak-wet. Sod runways built for twin engine aircraft hangar, rotating beacon. 80 and 91 octane. On your map as Otis Lodge, Duluth section. A&E mechanics on call. Write for folder. Communications: Unicom 122.8. Hertz cars.

MR. & MRS. ARTHUR R. OTIS
OTIS LODGE
Grand Rapids, Minnesota

VISUAL TRAINING
OF CANDIDATES FOR
PILOT RATING
To Meet Eyesight Requirements of C.A.A. or Air Force Exams
DR. JOHN T. FLYNN
OPTOMETRIST - ORTHOPTIST
Visual Training Specialist
300 W. 23rd St., New York City

NEW
BOOKS
from
AERO PUBLISHERS INC.
2162 Sunset, L. A. 26, Calif.

FREE Examination

☐ **CIVIL AIR REGULATIONS & FLIGHT STANDARDS FOR PILOTS.** New '58 Edition of the most popular "reg" book! Reprints of C.A.R.'s & data from Flt Info Manual & CAA Volumes, plus illustrated flying instructions, & private pilot exam.....$2.25

☐ **EXPERIMENTAL LIGHT AIRCRAFT & MIDGET RACERS** (Underwood & Calef). Photos & info of 300 home-built planes! Directory of kit & plan suppliers.....$2.50

☐ **U. S. ARMY & AIR FORCE FIGHTER PLANES** (Farley). Photos, 3-views, scale drawings, specs, & info on all fighters from Curtiss P-1 to Republic F-105.....$2.50

☐ **STANDARD AIRCRAFT HANDBOOK** (Leavell & Bungay). New 2nd Edition of mechanic's & factory-worker's booklet of methods, practices, materials, parts.....$2.75

☐ **FREE 1958 CATALOG OF AVIATION BOOKS**

Rush the books I have checked. Within 10 days after receipt I will pay for them plus a few cents postage, or return them in new condition.

SAVE! *Send money order or check with order and Aero Publishers pays delivery postage. Same return privilege.*

(F7)

Name_____

Address_____

(Continued from page 14)

car. The one set of footprints indicated that the body and car had been abandoned. Murder, no doubt . . . for there seemed to be no other answer. To make sure, I "buzzed" the scene a half dozen times to determine if the body held a spark of life but, despite the constant buzzing, there was no movement.

I was near the town of Arkansas City, so decided to report my find from that point, since the body was within the Kansas area and would come under the supervision of a Kansas Sheriff. I didn't know if Arkansas City was the county seat or not, but I could phone him from the airport, regardless of his location.

At the Arkansas City airport I told my story and was advised that the Sheriff headquartered in another town, but could be reached at that very moment in Arkansas City. I called the number they gave me and reached the Sheriff, telling him my story as briefly as possible. He asked me to take off immediately and fly to the scene, circling over it to direct him and his deputies to the abandoned car and the body. I followed his orders. I circled and buzzed the car until the Sheriff's car skidded along the snake-like tracks and to a stop behind the stalled automobile. The Sheriff went around to the front of the car from the left side while a deputy circled from the right. As they converged on the victim I saw the body move.

And was my face red when the Sheriff waved me on as he and his deputy lifted a drunken, mud-soaked man from the mire and half dragged him to their waiting automobile.

LOREN CARLBERG

HOT HOP TO HAITI

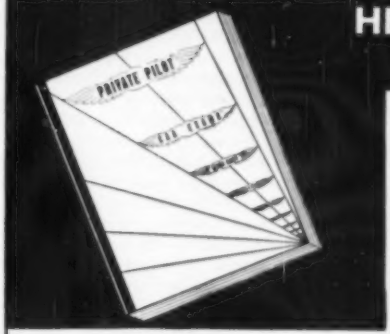
SHORTLY AFTER WWII, I was assigned to Utility Squadron Ten, located at the Naval Air Station, Guantanamo Bay, Cuba. Although rated as an electronic technician, I had qualified as a radioman in order to fly as flight crew member whenever the opportunity presented itself. Such an opportunity occurred when the squadron sent a plane over to Port-au-Prince. Never having been to Haiti, I set about convincing the pilot that a radioman who was also a technician could be a valuable crewman if trouble developed. He readily agreed, and we climbed into an old TBM for the trip. I rode in the after part of the fuselage, crammed in between reels of target-towing cable, piles of nylon targets, and radio.

Small windows in the sides afforded good view of the beautiful Haitian countryside as we approached our destination, and, by the time the pilot called the Port-au-Prince tower to request landing instructions, I was studying the details of the crowded city below with its marble capital gleaming in the sun. When the pilot's calls went unanswered, I wondered idly if the tower operators spoke only French. But after his third call, a voice boomed in my earphones in perfect English, "American plane in the pattern, please identify yourself and indicate land-

(Continued on page 84)

CAA EXAM AIDS

LATEST QUESTION & ANSWER BOOKS HELP YOU PASS THE NEW CAA EXAMS



EXAMS

These books contain copies of the latest CAA question & answer aids. They include all charts, diagrams and a refund slip. Save time, money & effort. Try them at our risk. Mail the coupon today.

ANSWER EXPLANATIONS

This book explains in simple steps how each answer in the exam book is obtained. It explains all calculations, navigation, computer, weather, CAR etc. This explanation book is used with the exam book.

CAA CHECK FLIGHTS

This book clearly explains how to pass the latest type CAA check ride. It has the latest maneuvers, requirements, oral test, diagrams, short cuts etc. Save expensive flight time and mail coupon today.

A & E PRACTICAL

This book clearly explains how to pass both mechanic practical tests. It includes oral exam, weight & balance, short cuts, demonstration jobs and a refund slip. Try it at our risk and mail coupon today.

HOME STUDY NAVIGATION

This book clearly explains step by step every basic type navigation problem. E6B computer, ADF, OMNI, ILS, charts, etc. It makes navigation problems simple and easy to understand. Order your book today.

( ) Commercial Pilot Exams
( ) Commercial Exams Explanation Book
( ) Commercial Check Flight
( ) Private Pilot Exams
( ) Private Exams Explanation Book
( ) Private Pilot Check Flight
( ) Instrument Pilot Exams
( ) Instrument Exams Explanation Book
( ) Instrument Check Flight
( ) Powerplant Mechanic Exams
( ) Airframe Mechanic Exams
( ) A & E Mechanic Practical
( ) Home Study Navigation Book
( ) Flight Instructor Exams
( ) Flight Instructor Check Flight
( ) Airline Transport Rating Exams
( ) A T R Exams Explanation Book
( ) A T R Check Flight
( ) Flight Engineer Exams
( ) Fundamentals of Ground Instruction Exams
( ) Link Instructor Exams
( ) Navigation Instructor Exams
( ) Radio Navigation Instructor Exams
( ) C.A.R. Instructor Exams
( ) Meteorology Instructor Exams
( ) Aircraft Instructor Exams
( ) Engine Instructor Exams
( ) Helicopter Flt. Instructor Exams
( ) Traffic Control Operator Exams
( ) Dispatcher Exams
( ) Parachute Rigger Exams

ANY 4 $10.00 ANY 2 $8.00
ANY 3 9.00 ANY 1 5.00

ACME SCHOOL OF AERONAUTICS

TERMINAL BUILDING
MEACHEM AIRPORT Phone
FORT WORTH, TEXAS MA 6-2444

☐ Payment enclosed ☐ Send COD
Please mail the items I checked above.

Name_____
Address_____
City, State_____

BLIND FLYING KIT

Learn instrument flying safely and quickly by using this kit in your airplane. This kit meets Army-Navy specifications EL50303 and is approved for CAA check flights. Kit contains the new precision design optical orange panels, blue lens goggles and the famous A.S.A. book on instrument flying. Panels are attached in a few seconds to windshield and windows with special suction cups. With goggles on, you can see everything inside but not outside. Kit is light, easily stored and durable. Goggles are light, comfortable, non fogging and can be worn over eyeglasses. Price is only $49.50 and can be shipped immediately direct from manufacturer. Check off your type airplane and mail in coupon today. Be safe by being prepared.

☐ Bonanza
☐ Cessna 180 182
☐ Tri Pacer
☐ Cessna 120 140
☐ Cessna 170 172
☐ Apache
☐ Cessna 310
☐ Navion
☐ Aero Commander
☐ Cessna 190 195
☐ Beech D18
☐ Stinson
☐ Swift
☐ Luscombe
☐ Super Cub
Others not listed

AIR RESEARCH INSTITUTE
MUNICIPAL AIRPORT
FORT WORTH, TEXAS

☐ Payment enclosed ☐ Send COD
Please send kit checked at left

Name_____
Address_____
City and State_____

SIMPLIFY NAVIGATION

With modern, easy-to-use Warner computers and plotters! Our devices are suitable for the student as well as the private, business executive, commercial and airline pilot. Every unit includes a basic 360° protractor which unquestionably simplifies the measurement of directions.

WARNER E-1 COMPUTER:

Most versatile of all modern computers. Combines a standard computer with a host of conversion markers, a 360° protractor, a runway computer, a pressure pattern computer and wind vector scales with no limit on air or wind speeds and which requires NO plotting for a quick solution.
List Price $6.50

WARNER PLOTTER:

For years the best plotter on the market! Includes a straightedge with distance scales to fit the air navigation charts, a 360° protractor which is rotatable. This feature simplifies and reduces errors in plotting courses, bearings, wind vector solutions. Scales are provided for variation and deviation corrections, also for making off-course corrections from checkpoint information.
Statute Miles Scales $2.25
Nautical Miles Scales $2.75

WARNER PLOTTER-COMPUTER:

A combination device with all the features of the Warner Plotter PLUS a standard computer! The computer provides solutions for speed-distance-time, fuel consumption problems, conversions, air speed and altimeter corrections and a seconds index for approach procedures.
Statute Miles Scales $3.50
Nautical Miles Scales $4.00

Warner Instrument & Sales Company

4734 N. Austin Ave. • Chicago 30, Illinois

ACADEMY of AERONAUTICS

COURSES IN
AIRCRAFT DESIGN TECHNOLOGY
AIRCRAFT ELECTRONICS TECHNOLOGY
AIRCRAFT INDUSTRIAL TECHNOLOGY
AIRFRAME & POWER PLANT TECHNOLOGY

Fall Term Begins Sept. 8, 1958

Write Now for Bulletin 70 for Details

LA GUARDIA AIRPORT
FLUSHING 71, NEW YORK

AIRCRAFT OF THE 1914-1918 WAR

10 DAYS FREE TRIAL

BY TEPPER, RIDING, & RUSSELL. CONTAINS 234 LARGE 11" x 9" PAGES OVER 200 WORLD WAR I AIRCRAFT, PRINTED ON GLOSS PAGES. 80 FULL PAGE DRAWINGS, 14 FULL PAGE SQUADRON PHOTOS, PLUS HUNDREDS OTHER PHOTOS OF EVERY PLANE IN BOOK. PLANES FROM U.S.A., ENGLAND, ITALY, FRANCE, GERMANY ETC. ARMAMENT, TYPE MOTOR, RATE OF CLIMB, SPEED ETC. FOR EACH PLANE GIVEN, PLUS "HISTORY" OF EACH INCLUDING RARE AND EXPERIMENTAL TYPES. OVER 80,000 WORDS IN TEXT. CLOTH BOUND. SEND PAYMENT IN FULL IF NOT 100% SATISFIED, RETURN BOOK WITHIN 10 DAYS FOR A FULL CASH REFUND.

CLOTH BOUND $11.95

FULL PAGE SAMPLES OF ABOVE ..... .25

"PLANEBOOK" 14-18 & OTHER PLANES 1000 DIFFERENT $1.00

"AEROMODELLER" British Aircraft magazine subscription, year ..$4.50 Sample copy 35

GULL MODEL AIRPLANE COMPANY
10 EAST OVERLEA AVE. DEPT. G BALTIMORE 6, MARYLAND

Hangar Flying

(Continued from page 83)

ing intentions." However, as the pilot's immediate response was followed by a repeat of the tower's request, it became obvious that we were not on the air.

I tore myself away from the window to glance at the radio gear, and my gaze was greeted by a bright orange flame! A quick examination showed the antenna lead-in insulation was burning; furthermore, it had almost reached a pile of nylon targets.

My reaction was immediate. A fast grab at the burning wire yanked it off, clear of the combustible targets. Fortunately, the pilot wasn't trying to transmit any more, so electrical shock wasn't added to the mild burns I received. Insulation doesn't burn rapidly, so the fire was easily put out.

Subsequent calmer reflection produced the realization that the flexible antenna lead-in had got too close to the plane's metal frame, so that when the pilot tried to transmit, the high voltage on the lead-in caused an arc to jump across, setting fire to the insulation. A new lead-in was quickly rigged well clear of any part of the plane, communications were properly established with the tower, and the landing was completed without incident.

RICHARD H. WILCOX

Washington, D.C.

IT'S THE ANGLE

ABOUT TWO YEARS AGO I was working as instructor for an airport operator at Fair Oaks, Calif.

On this particular Sunday one of the newer private pilots had rented an Aeronca Champion for a short cross-country to Placerville, in the rugged foothills of the Sierras, and was heard from next when he phoned and announced that he had experienced engine trouble and was lucky enough to find a barren hilltop to set it down on. It was still an hour and a half before sundown so Ted Strode, the airport operator, and I took off in another Champ to see if we could get the lost lamb bedded down safely for the night or return it to the port.

We had no trouble spotting the plane a half hour later, and after carefully selecting a nearby ridge-like pasture sat down and walked over to the next hill to check over the "sick" Champ. After looking under the cowl for blown jugs and loose wires, we decided to try to start it. The engine caught with the first stroke.

As I weigh about 115 pounds—I offered to give it a try. Ted readily agreed so I taxied bumpily around the crest of the hill, headed in his general direction, held brakes, and opened full throttle. Releasing the brakes, the Champ jerked forward over the top, down the other side, and was airborne on a downhill slant as I passed the boss. Then—everything went quiet! Ten feet off the ground and nothing ahead of me but a gully full of rocks and brush, and trees farther on. I dove, following the contour of the hill, turned sharply to my left, and headed toward the base of the side of the hill where we had landed. Having picked up the extra speed I needed in the shallow dive, I was able to coast up the side of the ridge just clear of the rolling ground, and when it did pay off, I was rolling still uphill, coming to a stop within yards of the other plane!

After I had disappeared over the hill from Strode's sight, he had just thrown up his hands and started toward the inevitable. As he came trotting up, I pointed out to him the gas running from the valve down and off my arm. Then the gas stopped flowing! With that "how could we be so stupid" look at each other, we glanced into the gas tank. Bone dry, although the gauge still registered one-quarter full! Conclusion came fast!—the Champ will draw gas in a three-point position longer than it will in level flight and this, plus the erroneous fuel gauge reading, had resulted in both forced landings.

Checking the other Champ showed about one-third full, approximately four gallons. Scouring around we found an old gallon jug in a farmer's trashpile and made the transfer, halving the fuel for each plane. Then we each took a Champ, lumbered off the ridge, and cruised at economy rpm's back to the airport.

WARREN T. MORISETTE

Sacramento, Calif.

"Now when the seat's ejected, don't forget to pull the rip cord."

FLYING
readership at
record high!

The circulation of FLYING has now soared to its highest peacetime level. According to Publisher's Estimates for the first 3 months of 1958, a monthly average of over 239,000 air-minded men and women now subscribe to FLYING or purchase it at newsstands.

This is the world's largest aviation audience and to serve it well will continue to be our goal.

The Staff

LATEST OFFICIAL AIRCRAFT PHOTOS

Rockets, Jets, Historical planes.
All makes, hundreds from which to choose.
SPECIAL INTRODUCTORY OFFER
with your name and address. Send only 25c
. . . select one packet.

4 3½x5 photos, world's fastest jets.
4 3½x5 World War II planes.
4 3½x5 of Rockets, Missiles.
1 8x10 photo Boeing B-52 Jet Bomber.
1 8x10 photo Lockheed F-104A Starfighter.
$2 VALUE FOR $1

All five packets for $1.00

Large illustrated catalog free with each order
MAIL YOUR ORDER NOW . . . TODAY
AVIATION PHOTO EXCHANGE
Dept. FF, Box 75084, Los Angeles 5, California

AVIATION

Aeronautical Engineering Technology, (accredited degree course). Approved for Veterans. Inquire about Airplane and Engine Mechanics Refresher Course for Government licenses. Credit allowed for military experience and training. Also ask about Administrative course. There are big opportunities in Aviation. Your success is important to us.

Founded by Curtiss-Wright • 30th Year

AERONAUTICAL UNIVERSITY
Air Line Pilots Association Building
At Midway Airport
55th St. and Cicero Ave., Chicago 38, Illinois

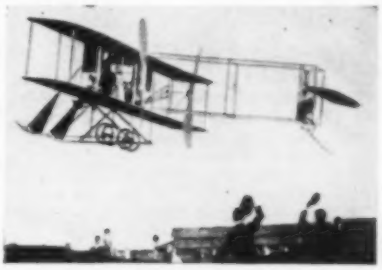
(Continued from page 8)

For the benefit of the record, Rodgers made his historical transcontinental flight using a Model B Wright biplane pusher upon which he had emblazoned "VIN FIZ," in large letters, advertising a once-popular soft drink. At the end of his flight there was no suitable place at Long Beach, Calif., to land so he landed at the old Dominguez Field, a few miles distant after circling over Long Beach to make flight qualify as official. It was soon after this that Rodgers crashed in the surf, while flying over Long Beach, and was killed. . . .

WM. A. DENEHIE, 3rd V.P.
The Early Birds
Chicago 42, Ill.

. . . The plane is an E-X Model Wright Biplane pusher. Also . . . the hangar shown (page 22) is not the one used by the Wright Brothers for the 1904 flights . . .

M. M. TODD
Dayton 5, Ohio.



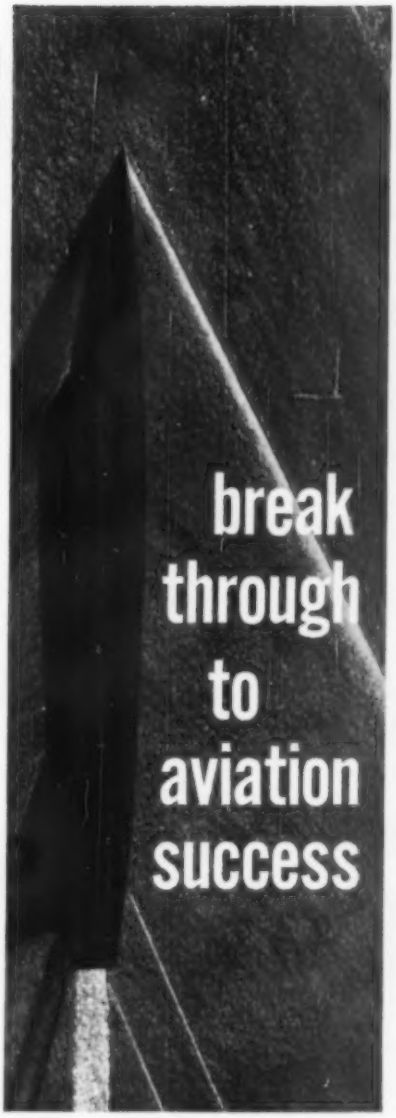
. . . The pilot's name was Calbraith; the flight began on Sept. 17, 1911, not Sept. 10th; the airplane was a Burgess-Wright . . .

ROBERT S. HOUSTON
Chief, Research Branch
Air Force Museum,
Wright-Patterson AFB, Ohio.

• *We stand corrected. The name is Calbraith, the plane is a Burgess-Wright model E-X and date of the flight Sept. 17, 1911. As for the hangar, the picture was taken in 1932 by a Dayton, Ohio, photographer. Print was made and submitted to* FLYING *especially for this article by a most reliable Dayton source.*—ED.

PICTURE CREDITS

10—PIPER AIRCRAFT, BEECH AIRCRAFT CORP.
22—JEAN RAEBURN
24, 25—SOVFOTO
26, 27—HARRY HARPER COLLECTION
28, 29—IDAHO DEPT. OF AERONAUTICS
32, 33, 34, 35—AEROFILMS, LTD.
36, 37—CESSNA AIRCRAFT
38, 39, 40—CONVAIR
44, 45—BILL BRUNK
46—WIDE WORLD, AIR FORCE
47—AIR FORCE, BELL AIRCRAFT CORP., AIR FORCE
60—DUANE VALENTRY
64—FED NEWS, SHELL OIL CO.
68—INTERNATIONAL HARVESTER
73—IDAHO DEPT. OF AERONAUTICS
90—BELL HELICOPTER, MORGAN FITZ, AMERICAN AIRLINES



Get started "on course" and *fast!* Choose your aviation direction, study in Air-Minded Miami, and you're on your way. There's excitement, high pay, and a limitless future waiting for you. Act now.

Embry Riddle

WRITE:
Director of Admissions
Embry Riddle Aeronautical Institute
122 Aviation Building • Miami 52, Florida

I want to be in the lead of the air frontier. Send me background material on world-famous E-R training.

Name .....
Address .....
City ..... State .....
Age ..... ☐ Vet ☐ Non-vet
I want to make my future in:
☐ Flight
☐ Aeronautical Engineering Technology
☐ Airframe and Powerplant Technician

MAIL THIS COUPON TODAY!

FLYING CALENDAR

June 28-29—Eleventh Annual Moonlight Flight of Porterville Area Pilots Association. For details, contact: PAPA, 1110 Mill St., Porterville, Calif., or phone Sunset 4-3870.

June 29—Fifth Annual Ranch Style Fly-in Breakfast, Bluffton Airport, Bluffton, Ohio, sponsored by the Bluffton Flying Club.

July 3-4—Timber Carnival, Albany, Ore., fly-in sponsored by Sportsmen Pilots of Oregon.

July 4—Breakfast Fly-In at the Crown Point (Ind.) Airport, sponsored by Crown Point C.A.P. Pancakes and sausage, $1. Door prize, $125 wrist watch—other prizes.

July 4—Idaho Flying Farmers Fly-In, Henry's Lake, Idaho. Alternate, Magic Lake or Bear Lake.

July 4-5—Fly-in to Willits Frontier Days at Willits Airport, Willits, Calif. Barbecue, parades, fireworks, fun.

July 4, 5—Fly-in to 32d Annual Northern California Championship Rodeo—parades, barbecues, dancing—sponsored by Willits Frontier Days, Inc. Contact: Ernestine G. Godwin, Willits Airport, Willits, Calif.

July 4-6—All-American Aviation Exposition, Connellsville-Pittsburgh Airport, Connellsville, Penn., featuring "History of Flight," Antique Aircraft, Experimental (Home-built aircraft). For information, write: All-American Aviation Exposition, 210 Semple St., Pittsburgh, Penn.

July 4-6—1958 Central Texas Soaring Meet at Georgetown (Tex.) Municipal Airport, host: Austin Div. of Texas Soaring Assoc.

July 4-6—Northeastern States Soaring Meet at Harris Hill, Elmira, N. Y. For information, contact: Jack Wilkins, 763 Hazel St., Elmira, N. Y., or Howard Burr, 635 Mt. Zoar St., Elmira, N. Y.

July 4-8—Twelfth Annual All-Woman Air Race from Montgomery Field, San Diego, Calif., to Municipal Airport, Charleston, S. C. For information, write: AWTAR headquarters, 2611 East Spring St., Long Beach 6, Calif.

July 5—Sportsmen Pilots Handicap Air Race at Morgan Hill, Calif. Contact Thomas C. Buck, sponsor, 13106 Galway St., Garden Grove, Calif.

July 5—Grand Haven Dawn Patrol, Memorial Airpark, Grand Haven, Mich., sponsored by Aviation Club.

July 5-6—Professional Race Pilots Assoc., time trials on July 5; heat races on 2-mile oval course on July 6. Total purse: $5,000, sponsored by Fulton Lions Club at Fulton, N. Y.

July 5-12—Fourth Annual Northwest International Soaring Contest, Wenatchee, Wash.

July 6—Tri-City Airman's Assoc., Annual Air Show at Morgan Hill, Calif.

July 6—Tecumseh (Mich.) Dawn Patrol sponsored by Exchange Club.

July 8-11—The Institute of Aeronautical Sciences, Nat'l Summer Meeting, Ambassador Hotel, Los Angeles, Calif.

July 12-14—Air Cruise to the Grand Bahama Club, West End, Grand Bahama Island, B. W. I., sponsored by the Fla. Aero Club, Inc. For details, contact Harry B. Collins, Air Cruise Dir., 375 N.E. 154th St., N. Miami, Fla.

July 13—Ann Arbor Dawn Patrol, Ann Arbor, Mich., sponsored by C. A. P.

July 13—Breakfast Fly-in, Wakonda Beach, Ore. 10:00 until noon.

July 16-22—Jaycee Air Cruise, Philadelphia to Mexico City, Mexico. Single and twin aircraft owners and families invited. Participants aircraft fee, $30. Contact: Marc Saunders, Air Cruise Ch., Jr. Ch. of Comm. of Phila., 121 South Broad St., Philadelphia, Pa.

July 18-19—Fly-in to Springfield, Ore., for chicken fry and log rolling sponsored by Sportsmen Pilots of Oregon.

July 19-20—Queen coronation and dance on Sat. Fly-in breakfast Sun., at Cascade Locks, Ore.

July 20—Flushing Dawn Patrol, Dalton (Mich.) Airport, sponsored by the Lions Club.

July 20—Sixth Annual Fly-in Breakfast sponsored by Pottstown Unit AOPA, at Pottstown Airport, Limerick, Pa. Rain date, July 27th.

July 22-27—National Model Plane Championships, Glenview Naval Air St., Ill.

July 25-27—Missouri Flying Farmers state convention, Lake of the Ozarks, Mo.

July 27—Ludington Dawn Patrol, Mason County (Mich.) Airport, sponsored by the Chamber of Commerce.

July 27—Fly-in breakfast, Aviation Day at Lebanon, Ore., sponsored by Sportsmen Pilots of Oregon.

July 27—Fourth International Air Show at Bellingham (Wash.) Airport, sponsored by the Bellingham Jaycees with the cooperation of the Bellingham Ch. of Commerce and Sportsman Pilots of Washington. Competitive events, exhibits, trophies, fly-in breakfast. Contact: R. C. Graham, Chairman, 1958 Air Show, Bellingham Jr. Ch. of Commerce, 1210 Cornwall Ave., Bellingham, Wash.

July 29-Aug. 7—Twenty-fifth National Soaring Contest at Bishop, Calif., sponsored by Soaring Society of America. Contact: Lloyd M. Licher, P. O. Box 66071, Los Angeles 66, Calif.

Aug. 3—Muskegon County Dawn Patrol, Muskegon (Mich.) Airport, sponsored by Muskegon Aviation Assoc., Greater Muskegon Jaycees, Muskegon Ch. of Aero Club of Mich., Muskegon C.A.P.

Aug. 3—Annual fly-in picnic at Mulino, Ore., sponsored by Sportsmen Pilots of Oregon. Mulino Chapter furnishes coffee and dessert.

Aug. 7-9—OX-5 Club third annual convention, Statler Hotel, Los Angeles, Calif., James Mattern, Ch.

August 8-10—Sixth Annual Experimental Aircraft Fly-in and Sport Aviation Meet. Curtiss Wright Airport, Mliwaukee, Wis. Everyone welcome. Write: Paul Poberezny, EAA, Hales Corners, Wis.

Aug. 9—Fly-in to Prineville, Ore., for Crooked River Roundup and parade. Bus from airport.

Aug. 10—Pacific City, Ore., Annual Fish Fry, sponsored by the Sportsmen Pilots of Oregon.

Aug. 10—Fly-In breakfast at Hyde Field Airport, Clinton, Md., sponsored by Washington Air Derby Assoc. Ham and egg breakfast, $1.25.

Aug. 10—Fowlerville Dawn Patrol, Newton (Mich.) field, sponsered by the Commercial Club.

Aug. 11-15—National Flying Farmers Assoc. 1958 convention at Hotel New Yorker, New York, N. Y. Teterboro Airport, Taterboro, New Jersey will be used to base NFFA planes. Contact: Exec. Sec'y, NFFA, Municipal Airport, Wichita 13, Kan.

Aug. 14—Ninth International Air Race (for women pilots) sponsored by Fla. Ch. of Ninety-Nines and the Grand Bahama Club, from Welland, Ontario, Canada to Grand Bahama Club, West End, Grand Bahama. Six cash prizes totalling $2,000. This is a handicap, daylight race. For details, contact: Miss Irma Price, 242 S.W. 8th St., Miami, Fla.

Aug. 17—Reed City (Mich.) Dawn Patrol sponsored by the Rotary Club.

Aug. 18-19—Annual Western Regional Meeting of American Astronautical Society, Inc. at Stanford Univ., Dinkelspeil Auditorium, Palo Alto, Calif.

Aug. 23, 24—Fourth Annual Jaycee Air Fair sponsored by Aviation Comm. of Portland (Ore.) Jr. Ch. of Commerce in conjunction with dedication of new multi-million dollar airline terminal at Portland International Airport.

Aug. 24—Northport Dawn Patrol, Clinton Woolsey (Mich.) Airport sponsored by the Pilots Club.

Aug. 24—Fly-in Breakfast. Aircraft displays, entertainment. County-City Airport, Chehalis, Wash.

Aug. 24—Fly-in breakfast to Troutdale, Ore. sponsored by Sportsmen Pilots of Oregon. Then plan to go on the Air Show and dedication at Portland International.

Aug. 24—Fly-in to Nehalem, Ore., for free feed and transportation. Bring your fishing tackle for "Surprise treat."

Aug. 30-Sept. 1—Kentucky Air Tour. For full details, contact: Frank L. Savage, Exec. Vice Pres., Kentucky Jr. Ch. of Commerce, 670 South Third St., Louisville, Ky.

Aug. 30, 31, Sept. 1—Schweizer 1-26 Regatta at Harris Hill, Elmira, N. Y. Contact: Jack Wilkins, 763 Hazel St., or Howard Burr, 635 Mt. Zoar St., Elmira, N. Y.

Aug. 31—Fly-in to Salem, Ore., to visit the State Fair. Local Sportsmen Pilots of Oregon will furnish free transportation.

Aug. 31-Sept. 1—Professional Race Pilots Assoc. air races at Fort Wayne, Ind. on a 2½-mile oval course. Total purse: at least $7,000. For details contact: Don Berliner, 19 Hudson Ave., Athens, Ohio.

Sept. 1—Grand Rapids (Mich.) Dawn Patrol, Kent County Airport, sponsored by Kent Pilots Assoc., Jaycees, C.A.P.

Sept. 2-6—National Convention and Airpower Panorama of Air Force Assoc. at the Fontainebleau and Eden Roc Hotels, Miami Beach, Fla.

Sept. 1-7—SBAC Flying Display and Exhibition, Farnborough, England.

Sept. 6-7—Annual convention of Western States Assoc. of Sheriffs Air Squadrons at Big Bear Lake in San Bernardino County, Calif.

Sept. 6-14—International Aviation Show, New York Coliseum, New York, N. Y.

Calendar items must be received at FLYING's editorial offices, 1 Park Avenue, New York 16, N. Y., three months prior to the event.

For the most complete line of engines... it's Lycoming

for every aircraft... for every job!

MODEL	#CYL	CAA#	FUEL GRADE	TAKE-OFF RATING (hp @ rpm)	NORMAL RATING (hp @ rpm)	WEIGHT (lbs.)
O-235-C1	4	223	80/87	115	108	236
O-290-D2B	4	229	80/87	140	135	264
O-320-A1A	4	274	80/87	150	150	272
O-320-B1A	4	279	91/96	160	160	278
O-340-A1A	4	277	91/96	170	170	280
O-360-A1A	4	286	91/96	180	180	285
O-435-A	6	228	80/87	190	190	392
O-540-A1A	6	295	91/96	250	250	396
VO-435-A1D	6	279	80/87	260	250	390
GO-435-C2B2	6	228	80/87	260	240	430
GO-480-B1A6	6	275	80/87	270	260	432
GO-480-G1B6	6	275	100/130	295	280	464
GO-480-G2D6	6	275	100/130	295	285	442
VO-540-A1A	6	*	80/87	310	305	435
GSO-480-B1A6	6	284	100/130	340	320	498
SO-580-A1B	8	285	100/130	400	350	578

*Pending

For further information on Lycoming's complete line of power plants, write to: Lycoming Division, Avco Manufacturing Corporation, Williamsport, Pa.

1900-1950 FIFTY YEARS OF POWER

Lycoming

A Division of AVCO Manufacturing Corporation | Stratford, Conn., Williamsport, Pa.

Classified Advertising

NOTICE: Rates, 50¢ per word. Minimum 10 words. September issue closes July 3rd. Send order and remittance to FLYING, 1 Park Ave., New York City 16

AIRPLANES FOR SALE

AERO COMMANDERS

17 FROM $30,000. November 1952, Model 520, ⌭FQGF/BF, has 250 hour remanufactured 260HP engines. Three-bladed propellers. Deicers. Rotating beacon. Complete L-2 auto-pilot. ARC-15B omnirange. 27 channel Simplexer. Dual ADF's. T11B transmitter. One owner. Exceptional. $33,500. Also; 560's and 680's. Powers & George, 475 Fifth Avenue, New York 17, New York. "Exporting Specialists."

BEECHCRAFT

BONANZAS: 19 available. Model 35, ⌭GSPQ/VF, has 400 total hours. Gyros. ADF-12. New tires, paint, upholstery. Undamaged. $7000. Also; 205HP, C-35, ⌭JXT/DF, with 435 engine hours. Beacon. Auxiliary tank. Flares. Gyros. Omnigator. ADF-12. Many extras. Beautiful paint. Hangared. Undamaged. $10,000. Also; H-35, ⌭2/F, with 30 hours. Auxiliary tanks. Gyros. Beacon. Mark 2 Omnigator. ADF-12. New. $23,200. Also; J-35's and Twin Bonanzas. Powers & George, 475 Fifth Avenue, New York 17, N. Y. "Exporting Specialists."

BELLANCA

BELLANCA Cruisemaster. 1950. 325 STOH. Narco, ADF-12. Will trade. Cobb Flying Service, Box 1202, San Angelo, Texas. Phone: 2-6204.

BELLANCA Cruisemaster demonstrator—Full instruments. Low time. Discount. Will trade, terms. Cobb Flying Service, Box 1202, San Angelo, Texas. Phone: 2-6204.

CESSNA

CESSNA 120. 60 hours on factory rebuilt engine, ready for installation of electrical system. Wings recovered May '57. Relicensed April '58. $2,250 or work out trade on Tri-Pacer. Will Connelly, P.O. Box 170, Birmingham, Michigan. Midwest 6-3000 day or night.

180's: 12 AVAILABLE. 1953, ⌭XZXT/AF, has 150 hours SMOH. Gyros. LF. Omnigator. ADF-12. Relicensed. Bargain. $8000. Also; September 1955, painted, ⌭FPJX/BF, with 500 hours. Gyros. Omnigator. ADF-12. Extras. Relicensed January. Undamaged. Beautiful $8525. Powers & George, 475 Fifth Avenue, New York 17, N. Y. "Exporting Specialist's."

56 CESSNA 172-320 Hrs. T T Full panel, Lear 12 channel Transceiver with Omni, L F & Marker Beacon Receiver. Company owned, always hangared, flown by Com. Pilot. Will take car in trade or make cash offer. Abels Auto Co., 1030 N. Meridian St., Indpls., Indiana. ME 9-2301.

170's: 17 AVAILABLE. 1951. 170A, ⌭QXZR/DF, has 300 engine hours. Gyro. LF. Omnirange. $4400. Also; 1954, 170B, ⌭GFRX/CF with 495 hour engine. LF. LTRA-8 Omnimeter. Simplexer. ADF-12D. Painted 1955. Relicensed April. Hangared. Clean. $6350. Also; 172's from $6000. Powers & George, 475 Fifth Avenue, New York 17, N. Y. "Exporting Specialists."

170B FLOATPLANES: 3 from $6990. Painted 1954, ⌭XRRX/CF, has new 195 hour engine. Factory corrosion-proofed. Stainless cables. Hoisting rings. Floats good. Primary blind. Lear VHF. Undamaged. Relicensed. $7365. Powers & George, 475 Fifth Avenue, New York 17, N. Y. "Exporting Specialists."

PIPER

APACHES: 18 from $19,990. 1956, ⌭XQXZ/PF, has 565 hours, zero SMOH. Auxiliary tanks. Gyros. Omnigator. Omniplexer. ADF-12. Hangared. Undamaged. Beautiful. Bargain. $22,750. Powers & George, 475 Fifth Avenue, New York 17, N. Y. "Exporting Specialists."

NAVION

23 FROM $5000. 1947, painted, ⌭TQPGF/F, has 636 hours, 151 SMOH. New Hartzell. Auxiliary tank. Gyro. LF. Omnirange. Extras. Clean. Relicensed. $5500. Also; Beautifully painted 1948 225HP, ⌭FXJS/KF, with 400 hours SMOH. Metal Hartzell. Gyros. Omnigator. Bargain. $6500. Also; 1950, 260HP, ⌭RQTQ/KF, with zero SMOH. Wing-tip tanks. Beacon. Gyros. LF. Omnigator. Bargain. Pretty. $8950. Also; Twin Navions. Powers & George, 475 Fifth Avenue, New York 17, N. Y. "Exporting Specialists."

STINSON

18 FROM $3000. 1949, all metal, painted 1957, Station Wagon, ⌭PZZQ/MF, has 440 total hours. Heavy crankcase. Metal propeller. Gyros. LF. Lear Omnimatic. Undamaged. Excellent. Bargain. $4250. Powers & George, 475 Fifth Avenue, New York 17, N. Y. "Exporting Specialists."

SWIFT

8 AVAILABLE. 1948 Temco, ⌭XGSQ/BF, has 800 hours, engine 10 hours STO. Aeromatic. Spinner. Mufflers. Gyros. LF. Omnirange. Extras. Clean. $3000. Powers & George, 475 Fifth Avenue, New York 17, N. Y. "Exporting Specialists."

AIRPLANES MISCELLANEOUS

$2.00 CAN save you hundreds. It's New! Now you can receive information each month on hundreds of aircraft for sale throughout the United States. At a glance you will know what is available, hours, date licensed, price, etc., of practically every type of airplane manufactured. We tell you who owns the aircraft and you deal direct, saving time, eliminating hours of travel, and by knowing the market you get the best deal possible. You can receive your first copy listing aircraft for sale immediately. Don't wait! Send $2.00 Today for a full year's subscription. Flyers' Market, published by Aircraft Listing Bureau, 5305 Congress Street, Chicago 16, Ill.

LIST your aircraft with H. A. S. Get full market coverage and individual attention on everything from Cubs to Convairs. $2000.00 minimum valuation. Helmer Aircraft Sales, 220 South State Street, Suite 1006, Chicago 4, Illinois.

AIRPLANES WANTED

CONVAIR 40's, C-47, DC-3, C-45, Light Twins. Hazell-Wolff Associates, Media, Pa., Lowell 6-8585, 311 W. Baltimore Ave.

STINSON or Luscombe Sedan, Price, Specifications, 7493 Bloomfield, Montreal, Canada.

SINCE 1947, Powers & George, 475 Fifth Avenue, New York 17, N. Y., have sold hundreds of airplanes world-wide, as America's leading Aircraft Brokers. List yours non-exclusively. "Exporting Specialists."

HELICOPTERS

HOMEBUILT Helicopter Handbook. Explanations; Components; Rotors; Airfoils; Design. $1.00. Homebuilt Helicopter Directory. Photographs; Specifications—Helicopters; Autogiros; Gliders. $1.00. San Urshan, Box 4332 N.P. Station, San Diego 4, California.

BUILD Heliscooter practical and convertible into either motorscooter or helicopter. Use readily available parts, radial-engine, auto-rotor. Four drawings, Parts list, Instruction, $2.40. Risingsun Engineering Co., Box 128, Waverly, Alabama.

FLYING Platform. Build using Drone engine, Ford gears. Bolted construction. Three scale drawings, Components description; $2.00. Shelby Industries, Box 573B, Bellflower, California.

TAIL rotor kits, blades for homebuilders. Pictures, specs., prices, 50¢. Adams, Box 6042-K, Lakewood, Calif.

AVIATION EQUIPMENT

BUY surplus aircraft, fuselages, engines, instruments, accessories, electronics, radiophones, helicopters, etc. direct from government. List, procedure $1.00. Included Free: "Non-government surplus", "Second-hand bargain" reports. Christopher Publications, Holtsville 25, N. Y.

NEW "Mark VIII-C improved Dead Reckoning Computer with instructions, pocket size only $2.50"; New E-11 pocket size high speed, high Altitude Computer $5.00; New "Airlines Computer," $9.00; "Bartori Pilot's all metal Computer," $15.00; Pressure Pattern Drift, $2.50; Pressure Pattern Plotter, $3.00; New E-6B, $10.00; Warner Computer, $6.50; Air Force Jet pocket computer, $7.50; "Jeppesen R2 Computer," $8.70. Free Catalogue. Pan American Navigation Service, 12021-8 Ventura Blvd., N. Hollywood, Calif.

NOW available, Brand new government surplus type B-4 time distance computers, with pressure, density and TAS corrections with simple instructions and sample problems. Satisfaction guaranteed $1.00. Eastairco, Box 135, Cathedral Station, New York 25, N. Y.

AIR Force and Navy Aircraft Survival Equipment, list 5¢. Yerger's Supplies, 305A Victory Lane, Angola, Indiana.

PARTS & ACCESSORIES

LARGEST stock in the U. S., of New, Used, and Overhauled engines, propellers, accessories and airframe parts. Free list by makes. Univair, Dept. D, Box 5306, Denver, Colo.

INSTRUMENTS

REMOTE Compass Outfit. Lightweight. Complete with miniature inverter and easy installation instructions. 12 volts. Perfect. Bargain, only $22. Jack Schultheis, Linthicum, Maryland.

PILOTS' ACCESSORIES

HERE at last, private pilot wings for licensed civilian pilots. Finest quality sterling silver wings. Available in lapel size at $2.50 and standard size at $3.50 for above pocket and flight jacket wear. Wear with pride the wings of a private pilot. Arnold Company, Box 741, Dayton, Ohio.

REPAIRS

AIRPLANE tires retreaded with natural rubber. New tire guarantee. Our retreading inspected and approved by United States Testing Company. Bargain prices on new U. S. Royal nylon airplane tires, any size. Stan the Tire Man, Mt. Vernon Tire Service, Mt. Vernon, Illinois.

LOG BOOKS

STEELE'S Pilot Log $1.50; Pilot Flight Record Log $1.00; Senior Pilot Log $5.70; Flight Navigation Record (Deluxe) $5.70; Airline Pilot Log $5.70; Air Stewardess Log $2.00; Air Navigator Log $2.00; Flight Engineer Log (Deluxe) $5.70; Aircraft Log $1.50; Engine Log $.70; Pilot Progress Rating Log $1.00. (Free catalog.) Pan American Navigation Service, 12021-8 Ventura Blvd., North Hollywood, Calif.

CHARTS & MAPS

WORLD coverage of all current aeronautical maps and charts. Agents for Coast & Geodetic Survey, Hydrographic Office, Air Force. Free catalogue available. Pan American Navigation Service, 12021-8 Ventura Blvd., N. Hollywood, Calif.

PARACHUTES

NEW Surplus—Sky Diving—Personal. Used $27.50 up. CAA. Guaranteed. Midwest Parachute, Novi, Michigan.

AVIATION BOOKS

WARNING—CAA examination is being changed: It takes more than questionnaires to prepare you for the new "open-book" CAA examinations. You need the text and background material that only the authoritative up-to-date Zweng Manuals provide. Used by aviation schools throughout the world. Fully illustrated, each manual averages more than 300 pages, with latest examination, too. There's a proven Zweng Manual for each rating: "Helicopter Rating," $5.00; "Commercial & Private Pilot Ratings," both for $4.00; "Instrument Rating," $5.00; "Airline Transport Pilot," $5.50; "Flight Instructor," $5.00; "Flight Engineer," $5.00; "Aircraft Dispatcher," $5.00; "Safety after Solo," new revision, $4.75; "Parachute Technician," $3.00; "Aircraft & Engine Mechanics," (including hydraulics, weight & balance) and new "Electrical Examination," $5.00; Meteorology for Airmen with examination (Zweng), $3.00; "Manual of the E-6B Computer," $3.00; "Rules of the Air," Indexed, illustrated, $2.00; "Ground Instructor, Basic," $2.75; and "Ground Instructor Rating, including examination," $4.00, prepares you; "Flying the Omnirange," $4.00; "Encyclopedic Aviation Dictionary," $6.00; "American Flight Navigator 1958 Deluxe Edition—examinations (Dohm)," $6.50; "Air Navigation," 1955 Gold Medal Edition (Weems) prepares for Navigator Rating, $6.00. We supply any book by other publishers, including: "Jet Aircraft Power Systems," $10.75; "Radio Operator's License," $6.60; Practical "Air Navigation" (Lyon), $3.00; "Stick and Rudder" (Langewiesche), $5.50; "Crop Dusting" (6 manuals), $12.50; "Flight Manual for Aviation Cadets" (Hoyt), $2.00; (Free Catalog). Pan American Navigation Service, 12021-8 Ventura Blvd., North Hollywood, Calif.

LIGHTPLANE plans, information, $4.75 postpaid. Brochure, dime. Wm. Fike, Box 683, Anchorage, Alaska.

"FLYING Clubs Do Pay Off"—complete guide to organization administration of flying clubs $1.00—Esco Aviation, 1654 Idlewood Avenue, Akron, Ohio.

AIRLINE Co-Pilot Practice Exams—prepare for airline interviews and tests—$4.00—Esco Aviation, 1654 Idlewood Avenue, Akron 13, Ohio.

ALL classes new and old aviation books. Illustrated lists 10¢. Aviation Literature, 180 Stevenson South, Oshawa, Ont., Canada.

GET "Morton's Problems in Navigation." Only $1.25 to Morton's, Box 212, Litchfield, Ill.

COLLECTORS item, "Up," a true story of aviation from first successful flight in heavier-than-air craft to 1931. Mrs. "Jack" Stearns Gray, the author, was the wife of George Gray, famous pioneer aviator. Together they lived early aviation, its trials, successes, failures, tragedies; knew intimately all the early greats. Profusely illustrated with about 90 priceless photographs, 400 pages, bound in cloth, stamped in gold. Limited Supply, $5.00, prepaid. Shenandoah Publishing House, Inc., Strasburg, Virginia.

"EXPERIMENTAL Light Aircraft & Midget Racers" book illustrates and describes 300 planes, only $2.50. 1958 "Civil Air Regulations & Flight Standards For Pilots" is the most popular Reg and flying procedure book, $2.25. Money-back guarantee. Aero Publishers, Inc., 2162-F7 Sunset Blvd., Los Angeles 26, Calif.

GREATEST selection of aviation books in the world! Free mail-order catalog. Aero Publishers, Inc., 2162-F7 Sunset Blvd., Los Angeles 26, Calif.

MANUAL — How To Recover Airplanes. Illustrated with sketches. $5.00 Postpaid. Jonathan Flying Service, Pulaski, Tennessee.

PHOTOS

AVIATION Photo & Book Collectors! New lists of photos & books now available. Including Pioneer, WWI & II. Exclusive photos of Historical planes, latest Jets. Send 25¢ for sample photo & book lists. Airbooks, P. O. Box 958, New Rochelle, N. Y.

WANTED!

Used airplanes, equipment or accessories!

The 230,000 purchasers of FLYING are always in the market for a good used plane or equipment buy. If you have something to sell, use FLYING's classified columns.

Just 50¢ a word including name and address. Minimum message: 10 words. For further information, write:

Martin Lincoln—FLYING
One Park Avenue, New York 16, New York

AIRPLANE photographs, beautiful large 14x17 color reproductions. Decorate dens, etc., with war planes in action. Six assorted. Send $1.00. Jarvis, Box 126 F, Bostonia, Calif.

WORLD'S largest stock of aeroplane photos and old and new aviation books. (Formerly Aeroplane Photo Supply). 52-page photo catalogue, 50¢; 52-page book catalogue, 25¢. Both catalogues and three sample photos for dollar bill. Stuart, Fairlight Hall, Hastings, Sussex, England.

AIRCRAFT Photos. All Originals. Send $1.00 for list and samples. Brian Baker, 3347 E. Hubbell, Phoenix, Arizona.

BINOCULARS

BINOCULARS. Potter's prominar 7 x 35 long distance. Very Sturdy. Lightest Weight. 19½ oz. guaranteed best made anywhere. 30 day money back guarantee. Only $89.50 (plus 10% federal tax). Send check or money order or 10% deposit for C.O.D. Flying clubs contact us for quantity discounts on all binoculars and cameras. Potter's Camera, 708 Flatbush Ave., Brooklyn 25, N. Y.

INSTRUCTION

OPERATORS, Instructors, Schools: prepare your students for the top—with Zweng Manuals. Complete Texts, latest typical examinations. Free catalogue. Aeronautical and Marine discount sheet. Pan American Navigation Service, 12021-8 Ventura Blvd., North Hollywood, Calif.

LEARN to Fly. Qualify for Flying Cadet. Officer Candidate or Specialist Training in armed forces technical schools. Get paid while learning. Prepare quickly for qualifying examinations. Guaranteed "Practice Tests" with answers: Flight Aptitude, $3.25; General Educational Aptitude, $3.25; College and High School Equivalence tests, $5.00. All three sets, $9.75, prepaid. Cramwell Books, FL-7, Adams, Mass.

METAL CONVERSIONS

SKYCRAFT Design. The best in metal wing and fuselage conversions. Get only flight-proven, lifetime Aluminum Alclad. Riveted rigid, strong, smooth, good-looking. No rib stitching, no kits, no risk. CAA-STC approved. Guaranteed airworthy. Hundreds of satisfied customers. Ercoupe $350 (includes new L.E.), 2 hr. exchange; Cessna 140-120 $395, 4 hr. exchange; Stinson 108 wings $595, fuselage $695, both $1195, takes one week. All prices complete—installed, ready to fly-away. Now's a good time. Skycraft Design, Dept. F, Old Star Airport, Langhorne, Pa. Windsor 5-7750.

PATENTS

INVENTORS. Without obligation, write for information explaining the steps you should take to secure a Patent on your invention. John N. Randolph, Registered Patent Attorney, 818-Victor Bldg., Washington 1, D. C.

SITUATIONS WANTED

AVIATION Personnel Available—Write To: Fitzgerald (Chicago Division), Dept. A-21, 815 Countryside Drive, Wheaton, Illinois.

COMMERCIAL Pilot, Canadian, 23, single, desires flying position anywhere in the world. 200 hrs. Float endorsement. Box 128, % Flying, One Park Ave., New York 16, N. Y.

BUSINESS OPPORTUNITIES

AVIATION Jobs—Names and Addresses Of Companies To Contact. $1.00. Fitzgerald (Chicago Division), Dept. A-1, 815 Countryside Drive, Wheaton, Illinois.

START your own aviation business with little capital. 47 opportunities. Details free. Christopher Publications, Holtsville 1, N. Y.

AVIATION Operators: Many operators are increasing their income by stocking Zweng texts and general aviation supplies. Apply for a Dealership now. Pan American Navigation Service, 12021-8 Ventura Blvd., No. Hollywood, Calif. (Free Catalog.)

HELP WANTED

HIGH-PAYING Jobs Now Open! We will rush latest confidential reports on best employment opportunities (foreign, domestic, skilled, unskilled). Hundreds of aviation jobs now available! Also, jobs in electronics, construction, shipping, oil, and other lines. Application forms. Free registration. One-year advisory service. All for $2.50 ($2.85 Airmail). Unconditional Money-back Guarantee. Aviation Employment Information Service, Holtsville 7, New York. Six reports included Absolutely Free: (1) Pilot's Business Flying Directory; (2) Helicopter Opportunities; (3) Government Foreign Service; (4) Directory of Companies with Foreign Branches; (5) Alaskan Opportunities; (6) Directory of Airlines and Aircraft Manufacturers.

AVIATION Jobs—Names And Addresses of Companies To Contact. $1.00. Fitzgerald (Chicago division), Dept. A-13, 815 Countryside Drive, Wheaton, Illinois.

COPYRIGHTED Reports on best paying opportunities in foreign and domestic employment for skilled and unskilled. Aviation, construction, government, oil, shipping, laborers, office-work, trades, factory, supervisory, unusual jobs of many types. Special reports for pilots, engineers, mechanics, all aviation specialists with Airlines, Feederlines, Aircraft Factories, Cropdusters, Corporation Aircraft, etc. One year registration-advisory service. All for only $2.00 ($2.25 airmail). (Reports sent C.O.D. on request.) Satisfaction guaranteed or double your money back. Our 12th successful year. Act today for best paying jobs. Research Services, Suite 514-FL, Meramec Building, St. Louis 5, Missouri.

PILOT and Non-flying Job reports covering entire aviation industry—Special List. Firms currently hiring—$2.00—Esco, 1654 Idlewood Ave., Akron, Ohio.

MISCELLANEOUS

"WINEMAKING; Beer, Ale Brewing." Illustrated. $2.00. Eaton Books, Box 1242-Y, Santa Rosa, California.

HOMEBUILT Designer Handbook: Formulas; Layout; Airfoils; Engines. $1.00. Homebuilt Airplane Directory: Photographs; Specifications—Experimental Biplanes, Lightplanes, Racers. $1.00. San Urshan, Box 4332, N.P. Station, San Diego 4, California.

GOVERNMENT Sells—Surplus Aircrafts; Fuselages; Assemblies; Accessories; Engine Instruments; Electronics; Boats; Amphibious Vehicles; Jeeps; Misc—You buy direct now from U. S. Government Depots at fractions of Army & Navy costs—Send for Bulletin "Depot List & Procedure"—$1.00. Box 8-B, Sunnyside 4, N. Y.

LETTERS and Numbers Precut, self-adhering Vinyl Regaletters eliminate masking and spraying. Available in 4", 12" and 20". Permanent colors. Meets CAA regulations. See your Distributor or: Regal Air Corp., 500 Fifth Ave., NYC.

EMERGENCY Rations—Send $10.00 today, check or m.o., to Van Brode Milling Co., Inc., Clinton, Massachusetts and receive two Van Brode Emergency Field Rations.

FISHERMEN—Lure them with Aero-Aquatic Action—$1.00 ppd. Rhodes, P. O. Box 413, Lewistown, Pa.

$100 CASH awards will be paid for authentic, dramatic first-person experiences, if adapted for new television series, "Charter Pilot." No writing experience necessary. Stories based upon aircraft mal-function cannot be used. Charter pilots only, forward outlines to Hallmark Films, P. O. Box 107, Ocala, Florida.

SOARING: The finest flying sport. Join The Soaring Society of America for Soaring magazine and other benefits. Request clubs nearest you. Member $10.00, Associate $5.00. Box 66071-F, Los Angeles 66, Calif.

Briefings . . .

(Continued from page 10)

maintain and luxurious in appearance. Collins and Aikman, New York designers of these fabrics have contracts with Pan Am, Delta, Trans-Canada and American for the interiors of their jets.

PARTICIPANTS in a "Science at Work" pilot project, Bronx High School of Science (N. Y.) students gather around Max Bart, Hughes Aircraft research engineer as he demonstrates plastics technology as actually practiced in an industrial laboratory. Initiated by Hughes in 1955 in California, this program—now

participated in by 13 other companies in the Los Angeles area—is designed to bring scientists into the classroom to help advance scientific knowledge. The "pilot" project in New York was held in conjunction with the annual convention of the Institute of Radio Engineers.

HAVING PASSED all CAA tests Aerojet General's "Junior Jato" (low-thrust jet-assist take-off) is being readied for production at the company's Azusa, Calif. plant. The smaller jato bottle is designed specifically to add safety to the operation of small civil and military aircraft.

EN ROUTE TO VANCOUVER, B. C. for delivery to Okanagan Helicopters Ltd., four 47-G2 Bell helicopters leave Fort Worth in formation. From the warm

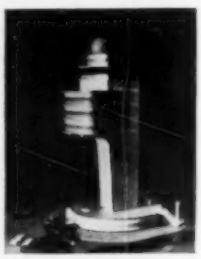
clime of Texas, the helicopters will be put to work with the Okanagan Group in the Northwest Territories and the Yukon.

TAKING NOTE of the widespread concern over safety in amateur rocketry, the U. S. Dept. of Education, (Publications Section, Washington 25, D. C.) has prepared a bibliography of the most recent books on rockets, jets and space exploration. Free upon request, the bibliography, compiled by Willis C. Brown, Specialist for Aviation Education Div. of State and Local School Systems, is also accompanied with some important suggestions to teachers and parents.

SELECTION OF THE Lockheed Electra for anti-submarine warfare has been announced by the Navy after an extensive evaluation study of it and other planes. Powered by four Allison T-56 turboprop engines, the airplane will carry a crew of ten men and equipped with the latest instrumentation for the detection and destruction of enemy submarines. It is eventually to replace the Lockheed P2V Neptune.

NARCO has introduced the Sapphire 1016A, an improved and transistorized version of the Sapphire 1016 all-channel VHF receiver and transmitter. Smaller by 3½ inches, power supply cut by half, and weight reduced by four lbs., the 1016A comprises a 90 to 360 channel transmitter, 90 to 560-channel receiver, new transistorized power supply and many new component and system improvements.

FLYING INTO NEWARK AIRPORT about this time next year, pilots will be receiving landing and take-off instructions from CAA housed in this ultra-modern control tower. The Port of New York Authority has started construction of the 150-foot-high tower, with occupancy by CAA scheduled for summer of 1959. Cost of the building is $1,750,000.



COMPLETELY NEW and right up-to-date with latest changes and meaningful information about 6,000 U. S. airports, the 1958 "Airport and Business Flying Directory" is now on sale. It is published by McGraw-Hill Publishing Co., 320 W. 42nd St., New York 36, N. Y.

FOR ITS PROPOSED National Aviation Facilities Center the AMB has selected the Naval Air Station facilities at Atlantic City, N. J. Also utilized by scheduled airline operations, the site permits a ready-made user group—commercial, general aviation, and military including carrier-based aircraft—to participate actively in the efforts of the Board. AMB expects to begin operations sometime after July 1, 1958.

DOUBLING ITS SIZE after but two years as the first out-of-Dallas operation in the company's history, the Midwest Division of Southwest Airmotive has moved into new quarters at 420 E. Donovan Rd., near Kansas City's Fairfax Airport. Simultaneously, Division Manager Bob Jackson announces the opening of an enlarged CAA-approved instrument and accessory overhaul shop at K. C.

OWNERS OF A SMALL but growing chain of hotels in different sections of the State of Georgia, these three hotel executives know there's nothing like flying to expedite their business, and keep a

first hand grip on current operational procedures in their hotels. With their Tri-Pacer are (L to R) Ralph Breshears, president; M. M. Witherspoon, Jr., V.P. and Secretary; and Otis Phillips, Jr., V.P. and Treasurer, all from Augusta.

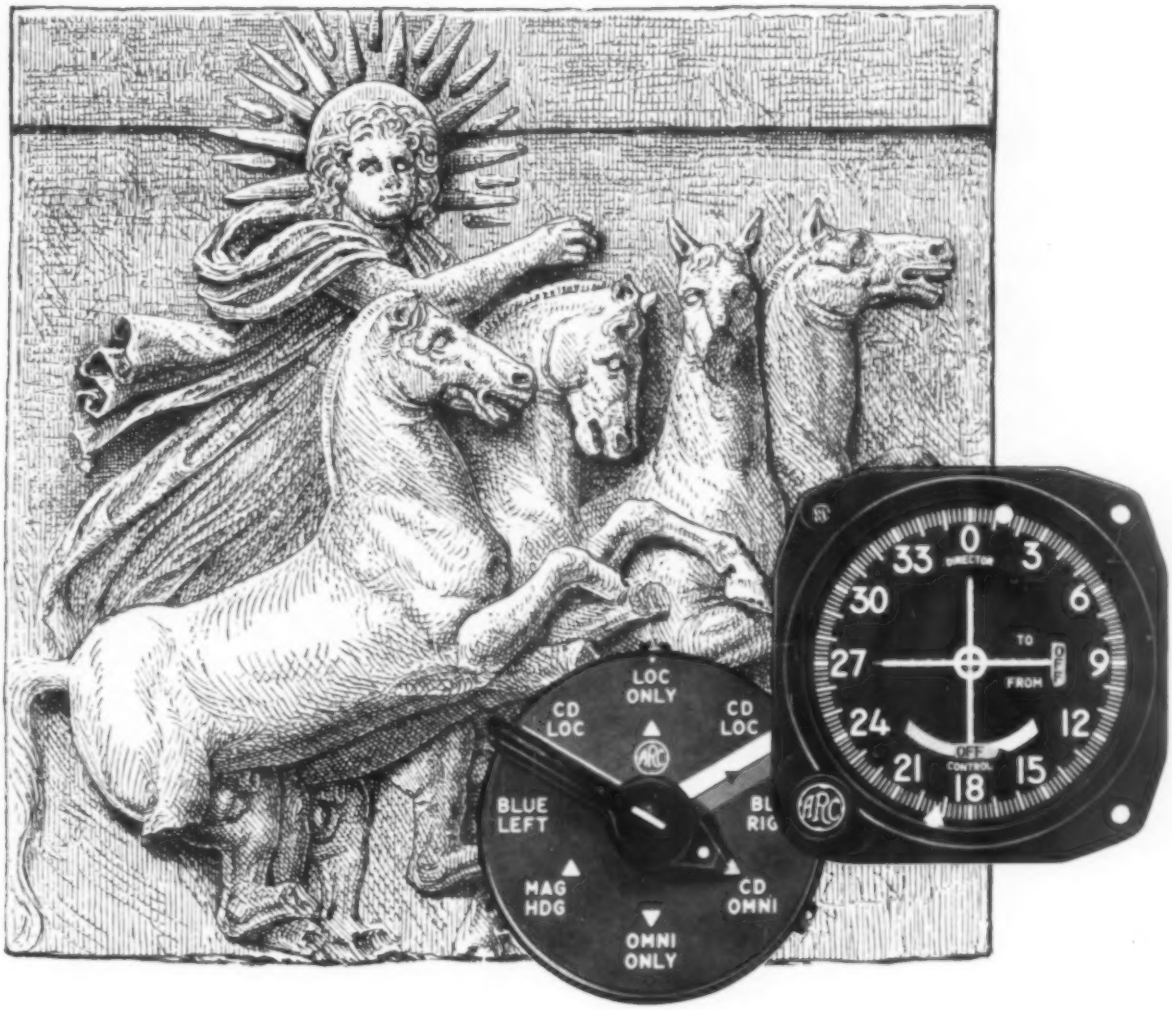
NEW AND EASY WAY to learn the Morse Code is being offered in the form of a code card 3½x1½ in., gummed on back for easy application to the panel of any aircraft. A project of the Austin Pilot's Club, Inc., of Austin, Minn., whose aims are to promote safer flying among private pilots, the code card, with instructions, comes free. Submit only 25 cents, to cover cost of printing and mailing, to 125-A No. Main St., Austin, Minn.

ON COAST-TO-COAST American Airlines Mercury flights the businessman who wishes to do a little work on the way, or the pleasure traveler who would like to record highlights of the trip, are able to do so now with this lightweight portable voice recorder. Developed by the Soundscriber Corp. of New Haven, Conn., the recorder weighs just six pounds and its plastic records can record

up to 15 minutes of conversation. Discs can be played back on a 33⅓ record machine or transcribed free at Soundscriber outlets or home office.

IN THE INTEREST of private flying needs the Alabama Dept., of Aeronautics is establishing a state-wide council called the Alabama Council for Private Flying. The council will be composed of presidents of flying clubs, aero clubs and other flying organizations, both local and state. Harold F. Wood of Birmingham, a pilot and active in aviation for 28 years has been asked to serve as chairman.

PRINTED IN U.S.A.



Flying Teamwork at its Best

THE ARC COURSE DIRECTOR WITH 15-E OMNIRANGE RECEIVERS

Ancient Greeks believed that Helios, the sun god, carried the sun around the earth daily in a horse-drawn chariot. Navigation is a more precise science today, with hundreds of pilots using ARC's Course Director.

To be sure of the exact headings required to intercept and fly any desired VOR radial or runway localizer, pilots no longer need to perform exacting mental calculations. ARC's Course Director, teamed with single or dual omnirange receivers, relieves the pilot of many problems — does most of his work... tells him when he is heading right. No more mental intercept calculations, or step-by-step changes in heading to determine proper cross-wind correction: The chances of a safe approach and landing are materially increased.

To fly a desired VOR track, simply select the VOR station, set the course director to the angle of the desired track, and turn the aircraft until the vertical needle of the cross-pointer is centered. Then steer to keep the needle centered. The aircraft will intercept the selected track and follow it. Wind drift is no problem, as a computer compensates for this automatically.

Here is precision flying . . . simplified navigation, engineered and built to perform dependably. Ask your dealer to install the ARC CD-1, along with a dual installation of ARC's Type 15 VOR equipment. They work as a team to provide you with greater flight safety. ARC's 30 years of experience solely in airborne electronics assures you of this.

Dependable Airborne Electronic Equipment Since 1928

Aircraft Radio Corporation BOONTON, N. J.

OMNI LOC RECEIVERS • MINIATURIZED AUTOMATIC DIRECTION FINDERS • COURSE DIRECTORS • LF RECEIVERS AND LOOP DIRECTION FINDERS
UHF AND VHF RECEIVERS AND TRANSMITTERS (5 TO 360 CHANNELS) • INTERPHONE AMPLIFIERS • HIGH POWERED CABIN AUDIO AMPLIFIERS
10-CHANNEL ISOLATION AMPLIFIERS • OMNIRANGE SIGNAL GENERATORS AND STANDARD COURSE CHECKERS • 900-2100 MC SIGNAL GENERATORS

30 YEARS OF ACHIEVEMENT IN AIRBORNE ELECTRONICS
1928 ARC 1958

The first approved oils for jet age airlines

A new era in aviation is unfolding—turbo-jet airliners are joining our commercial airline routes. Esso is especially proud that its Turbo Oil 15 was the *first* to be approved for use in the new Pratt & Whitney jet engines . . . and that Esso Turbo Oil 35 was the *first* to be approved for the new Allison Turbo-prop engines.

A decade ago, Esso Research anticipated the need for a new synthetic lubricant for aircraft turbine engines. Working with American and British designers and manufacturers, Esso Turbo Oils 15 and 35 were developed. Because these synthetic lubricants were used by manufacturers of jet engines in the development and testing of these new engines, they are thoroughly time tested and performance proved.

Esso Turbo Oils 15 and 35 were the *first* turbo oils to be approved by manufacturers of the following commercial turbo-jet and turbo-prop engines:

TURBO OIL 15

Pratt & Whitney JT-3 and JT-4.....Boeing 707 • DC-8

TURBO OIL 35

Allison 501.....Lockheed Electra

Rolls Royce Dart.....Vickers Viscount • Fairchild F-27

Rolls Royce Conway.....Boeing 707 • Douglas DC-8

Rolls Royce Avon.....Sud-Aviation • Caravelle
DeHavilland Comet IV

Bristol Proteus 755 .....Bristol Britannia

You can depend on Esso—*first* in quality and in service!

TURBO OILS

ESSO

ESSO RESEARCH works wonders with oil